Children's Hospital of Boston, 1869-1914

THE HISTORY AND PROGRESS OF FORTY-FIVE YEARS.

I. The Architecture of the Children's Hospital. Charles A. Coolidge, A.M.

II. The Development of the Hospital with Especial Reference to the Medical Service. Thomas Morgan Rotch, M.D.

III. The History of the Children's Hospital, with Especial Reference to the Orthopedic Department. R. W. Lovett, M.D.

IV. The Work of the Children's Hospital in 1913. John Lovett Morse, A.M., M.D.

V. Orthopedic Surgery at the Boston Children's Hospital. A Review of Thirty Years of Continuous Service. E. H. Bradford, M.D.

VI. Infantile Scorbutus. John Lovett Morse, A.M., M.D.

VII. Inguinal Hernia in Children. James S. Stone, M.D.

VIII. A Case of Chondro-Osteo-Sarcoma. Amputation at the Hip. Robert W. Lovett, M.D.

IX. Obstetrical Paralysis, with Especial Reference to Treatment. John Jenks Thomas, A.M., M.D.

X. Round Shoulders with Short Clavicles. Augustus Thorndike, M.D.

XI. Removal of Foreign Bodies from the Esophagus and Lower Air Passages by the Aid of Endoscopy in Children. D. Crosby Greene, M.D., and F. E. Garland, M.D.

XII. The Influence of Alkalies upon Gastric Motility. Maynard Ladd, M.D.

XIII. A Study of the Etiology in One Hundred and Seventy-five Epileptic Children. Arthur Willard Fairbanks, M.D.

XIV. Hemorrhage Following Tonsillectomy. F. E. Garland, M.D., and D. Crosby Greene, M.D.

XV. Poliomyelitis. Operative Treatment. Robert Soutter, M.D.

XVI. The Importance of the Early Recognition of Acute Arthritis of the Hip-joint in Infants. Arthur T. Legg, M.D.

XVII. The Diagnosis of Enlarged Thymus and the Symptomatology of Hyper-Thymatism. Philip H. Sylvester, M.D.

XVIII. The Treatment of Cervical Adenitis in Children. W. E. Ladd, M.D.

XIX. A Case of Lymph Cyst of the Mesentery. Charles G. Mixter, M.D.

XX. Flat-foot in Children. Albert Ehrenfried, M.D.

XXI. Pyelitis in Infancy and Childhood. Edwin T. Wyman, M.D.

XXII. Two Cases of Cirrhosis of the Liver in Childhood. Theodore Ely, M.D.

XXIII. The Report of a Case of Multiple Bone Tuberculosis Atypical in Its Distribution and X-ray Appearances. Henry J. FitzSimmons, M.D.

XXIV. The Significance of the Von Pirquet Reaction in Surgical Tuberculosis in Children. L. Bruce Robertson, M.D.

I.

The Architecture of the Children's Hospital.

By Charles A. Coolidge, A. M.

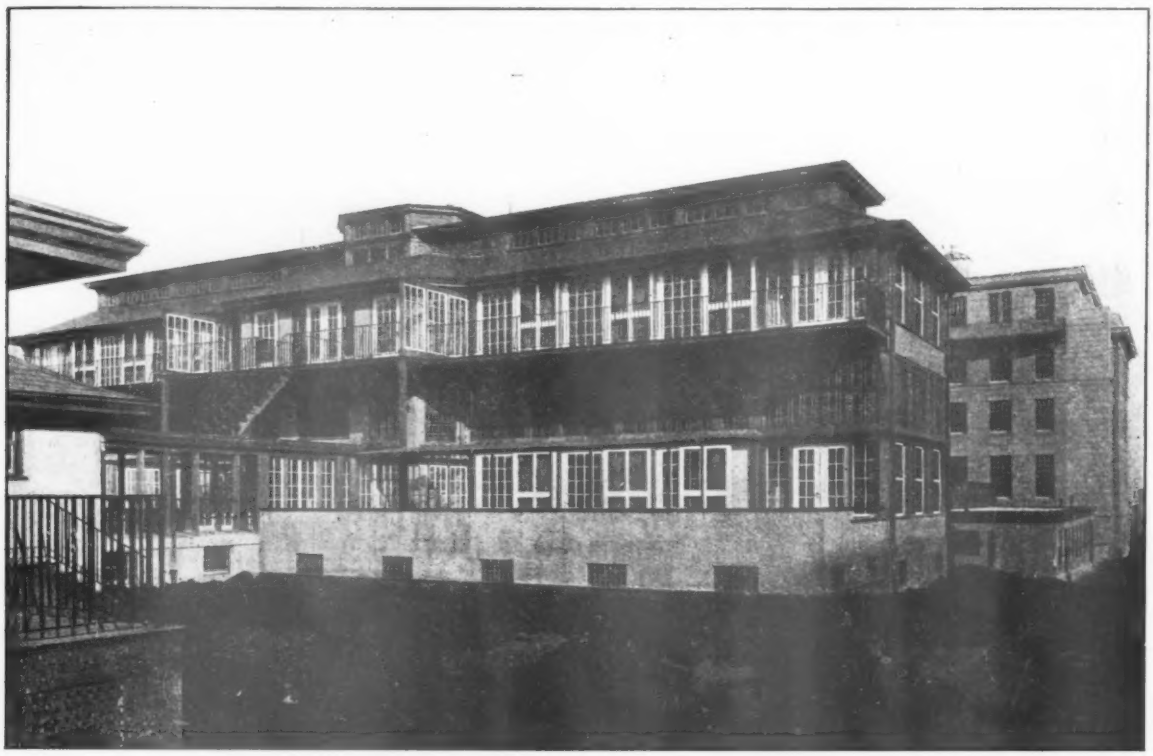
The Children's Hospital as an architectural problem was quite an unusual one. There were three separate gifts which required to be individualized and yet it was evident for the sake of convenience of administration and economy that three separate buildings should not be built. After several studies it was finally decided to build the present arrangement, which consists of an Administration Building which occupies the centre of the Main Building, from the money left in memory of Mrs. Robert Hooper, the Dispensary Building which is the portion of the Main Building to the west of the Administration Building, from the gift of Mr. F. W. Hunnewell, and the Nurses' Home, the portion of the Main Building to the east of the Administration Building, from the money left by Anne White Vose for a Nurses' Home. These different portions are separated by fire walls and are practically separate in their uses as well as in construction. These main buildings are fireproof throughout and the exteriors are built of a concrete conglomerate which consists of crushed trap rock, sand and Portland cement, without any coloring matter, which has a tendency to weaken the concrete. No attempt has been made to make it an artificial stone, but simply to have the most durable material, and to make the mass a uniform color which gives a more solid appearance to the structure than brick with stone trimmings, especially as there are a great many windows and quite large ones.

In the Administration Building are the offices, reception rooms, examining rooms, kitchen and serving rooms, storage rooms superintendent's suite, X-ray department, house doctor's quarters, ladies' aid rooms and servants' quarters.

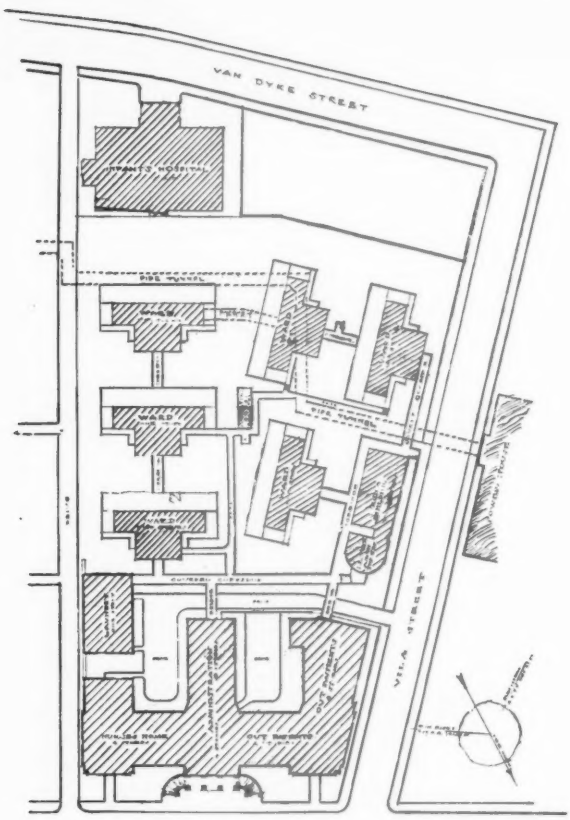
In the Dispensary Building are the receiving room, isolation suite for immediate isolation of possibly contagious cases, separate waiting rooms, examining rooms, treatment rooms, etc. for all departments, operating rooms and recovery rooms for minor surgical cases, plaster rooms, gymnasium, etc.

The Nurses' Home is built for seventy nurses with five rooms for the sisters who have charge of the hospital.

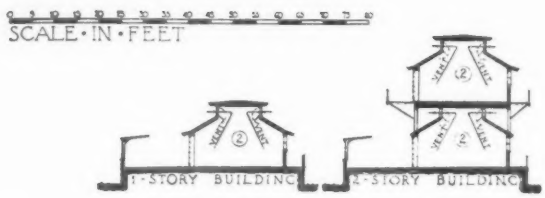
At the request of the medical staff the top floor of the Dispensary has a ward and arrange-



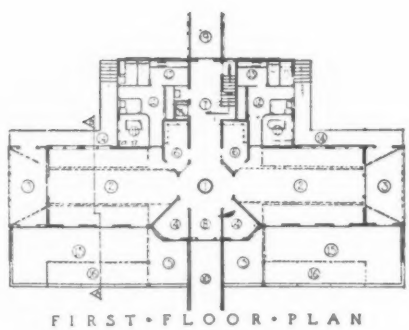
WARD BUILDING.



Block Plan of Buildings.



Ward Buildings.



KEY TO PLAN.

1. Lobby.
2. Ward-room.
3. Solarium.
4. Isolation Room.
5. Isolation Piazza.
6. Kitchen.
7, 8. Corridors.
9, 10. Connecting Corridors.
11. Bath-room.
12. Corridor.
13. Laboratory.
14. Piazza.
15. Piazza.
16. Shelter.

ments for dispensary cases so that when necessary a dispensary patient can be kept there, and not taken into the regular hospital. This ward and rooms are isolated. On the top floor are also a limited number of rooms for private patients. Except the above, all the patients are in ward buildings on the pavilion plan, entirely outside the Main Building on Longwood Avenue, and connected with it by a circulating corridor which has three levels, the lower one for pipes and heat, the second which is enclosed and half above grade, for food, etc., and the upper one which is on the level of the main floor, for general circulation. The latter is screened with glass sash where necessary, and has a flat roof which can be used as an emergency fire escape.

These wards are not of fireproof construction as the lower floors are practically on the ground level and the upper floors have large balconies on three sides connected with the roofs of the corridors. It was the intention to keep the shells of these ward buildings as inexpensive as possible, so that in the future as the treatment of hospital wards changes, the trustees would not be hampered with too expensive permanent wards. This does not mean that the arrangements for the comfort of the patients, or the plumbing or sanitary arrangements are not the best, but that the wards are of rough cast instead of stone or brick. A plan and section of the double wards is shown so that it is not necessary to go into the details, but merely to call attention to certain particulars.

There are at present two two-story double wards and two one-story double wards, and locations left for two additional double wards in the future. By double wards is meant a ward on each side of the corridor on the same level. These single wards contain ten beds each with an observation room separated, making twenty-two beds in a single story building and forty-four in a two-story building.

In planning for the future increase in the number of the beds, it is the intention to place another story on the one-story wards, making them two-story wards as shown in the accompanying section.

The wards have been carefully placed so that this can be done without cutting out the sunlight from the other wards. The wings of the Main Building on Longwood Avenue have also not been carried out to their full capacity to the south, so that when the number of beds in the wards is increased, which they can be to double the present number, the corresponding departments such as the Nurses' Home, etc., can be increased in the proper proportion in the Main Building.

The method of ventilation in the wards is by a monitor top in the ceiling as well as the windows on the sides. Those toward the south are large sliding doors with metal plates attached to the doors fitting tight into a deep slot in the bottom and sides. These doors make practically an open ward in summer, and allow the beds to be easily pushed out on to the piazza to the south, which is fifteen feet wide. This piazza treatment with a narrow roof on the outside away from the building is new, and has the advantage of allowing the sunlight to enter the ward and yet protecting the patient from the direct rays of the sun and the rain. In placing the second story ward above the first story ward, the monitor form is retained in both upper and lower wards, there is no damage done to the lower ward as far as ventilation or light is concerned, as the outer wall in front of the first-story monitor is merely open lattice, so that the air has perfectly free access to the windows in the monitor top; also the balconies on the second story, which are wide, are so far above the windows in the lower ward as not to interfere with the sunlight. Each separate ward can be entered from out of doors and access cut off entirely from the main corridor, and as each ward is complete in itself, if desired there can be perfect isolation.

The main operating rooms are in a building by themselves. There is an amphitheatre seating 83, with a separate entrance for the students from the outside. This amphitheatre will probably be used for lectures rather than for ordinary surgical demonstration, which will be given in the regular operating rooms of which there are three. In the usual large amphitheatre it is very difficult for the students to see much of an operation and an endeavor has been made in the smaller rooms to place twenty-four students within five or six feet of the patient while being operated upon. This has been done by placing low galleries at six feet four inches from the floor and as nearly over the operating table as good light will permit. There is a gallery on each side of the table, on which six students sit and six stand up, with a rest, and look over the shoulders of those sitting. Thus the operating table being three feet from the floor, they are as near as possible without interfering with the surgeon and his assistants. There is a large plate glass screen between the students and the operating room proper, and a heavy iron rail prevents them from leaning on the glass

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II.

The Development of the Hospital, with Especial Reference to the Medical Service.

By Thomas Morgan Rotch, M. D.

Report of the Board of Managers written by the Rev. Chandler Robbins, D. D. and presented to the Corporation in December, 1869, states that the original plans together with the by-laws for the Children's Hospital were laid before a few gentlemen on the 9th day of Decem-

ber 1868. An association for the establishment of a Children's Hospital in Boston was formed on the 23rd day of January, 1869, and the act of incorporation granted by the legislature in February of the same year was accepted, and the corporation duly organized on the 22nd day of March, 1869.

With the limited means at the disposal of the managers the hospital was begun in a small way. A house at No. 9 Rutland Street was bought and the Hospital was opened on the 19th day of July, 1869, and was dedicated with appropriate services on the 3rd day of August in the same year. Its capacity was 20 beds. The first patient was received on July 20th. In this house the hospital continued for one year.

In July, 1870, the managers secured by lease the estate at No. 1583 Washington Street with a capacity of 27 beds and this was occupied until 1882. In 1880 a lot of land, measuring about 31,000 square feet, was purchased on Huntington Avenue and the present building erected. It was dedicated on December 20, 1882. The medical staff was composed of a consulting board—Drs. F. H. Brown, John Homans, and William Ingalls; of physicians—Drs. A. M. Sumner, F. Gordon Morrill and J. P. Oliver; and of surgeons—Drs. S. W. Langmaid, E. H. Bradford and A. T. Cabot. Dr. H. C. Haven was Assistant Physician and Dr. Abner Post, Assistant Surgeon. Dr. W. H. Whitney was pathologist and Dr. N. O. B. Wingate was physician to the Convalescent Home. During the year the medical staff was increased by the addition of Dr. Thomas Morgan Rotch as assistant physician, and the managers, at the suggestion of the staff, appointed as resident house officers H. S. Otis and G. Haven with N. J. Knowles, Jr. as externe.

In the report presented by the managers to the corporation in 1885 and again in the reports of 1886-87 attention was called to the importance of the Out-Patient Department, a branch of the Hospital which, for some years had been doing a large amount of work in an admirable manner but in restricted quarters. In the latter part of 1886 the managers purchased a lot adjoining the former site, containing about 5000 square feet, and a thoroughly arranged and commodious building for out-patients was opened in September, 1888. The foundation of the east wing was also laid at this time.

One distinctive feature of the plan of the Children's Hospital was that it should be under the voluntary charge of the Evangelical Sisterhoods. Early in 1869 the Ladies' Aid Association was formed by the late Mrs. Chandler Robbins who gathered about her a band of devoted women and they and their successors have since constantly labored for the welfare of the institution. To them also is due the organization and support of the Convalescent Home at Wellesley.

At a meeting of the managers in 1881 it was voted to permit the establishment of memorial beds by those who desired to connect with the hospital the names of deceased children or friends.

On the 22nd of October, 1889, the east wing was opened for inspection and the capacity of the institution was increased to 96 beds. The new wing was intended mostly for medical cases, the two wards of the west wing being given up to surgical cases.

At the suggestion of the medical staff, Dr. Oliver F. Wadsworth was appointed Ophthalmic Surgeon; Dr. C. J. Blake, Aural Surgeon; Dr. H. L. Morse, Assistant Aural Surgeon; and Dr. Algernon Coolidge, Jr., Assistant in Diseases of the Throat.

Another object which the founders of the Hospital had in view was the establishment of a training school for nurses. During the year 1891 the managers carried out this plan and young women were received as pupils, the course of instruction lasting two years.

In accordance with the request made by the authorities of the World's Fair held in Chicago in 1893, it was deemed advisable to prepare an exhibit consisting of plans and views of the Hospital and Convalescent Home, reports, schedules of work performed, illustrations of treatment of patients and appliances, all of which might be of service to those interested in similar work. The plan was carried out and the exhibit shown in the anthropological department of the Fair.

It is well at this point to call attention to the reputation for excellent work which the institution has deservedly earned throughout the country among the laity as well as the medical profession. That this reputation is recognized is evidenced by the fact that during the year 1890 patients came for treatment from all parts of the United States as well as from New Brunswick, Nova Scotia, and Aberdeen, Scotland. Another evidence of the superior advantages offered by the institution is the number of physicians who come from afar to avail themselves of the clinical teaching and abundant material to be found in the wards. Interested students esteem it a high favor to be able to work under the physicians and surgeons in charge.

While it is well known that the hospital at no time had received contagious diseases, it has always been willing to bear its burden of responsibility and care for the cases which have arisen within its walls. Great precautions have always been employed to avoid such conditions. Diphtheria has always been one of the diseases to which children are more particularly liable and in 1895 much attention was given to the improving of the hygienic condition of the hospital building to guard not only against diphtheria but other contagious diseases. These investigations have been carefully followed up and in 1896 we find the bacteriology, etiology,

and the diagnosis and treatment of infectious diseases being scientifically pursued. The work on diphtheria is especially commendable and an article on the subject by Dr. F. Gordon Morrill in the Boston Medical and Surgical Journal drew wide and favorable comment. It is interesting to note that at this time every patient that entered the hospital was given an immunizing dose of diphtheria antitoxin, this being the first instance on record where such a procedure had been rigidly carried out in any institution. Since this measure has been adopted diphtheria has been practically eliminated from the hospital.

An incident of importance in the history of the hospital was the publication in 1895 of a volume called "The Medical and Surgical Report." This volume was highly commended by competent critics both here and in Europe.

In 1883, when one wing of the present building was occupied, we note that there was a daily average of 37 patients. In 1892, the year after the whole of the building was occupied the daily average of patients in the wards was 64. In 1890 the number of patients treated in the wards was 442, and in 1900 it was 1394.

In 1890 new cases in the out-patient department numbered 1,712 while in 1900 there were 2,586. In 1890 the visits to the Out-Patient department were 7,291, in 1900, 21,436, Up to 1900 there were no visits made for outdoor relief but in that year the value of this department of the hospital was fully proven and there were 1,828 house visits made by members of the hospital staff and nurses. In 1890 the number of nurses in the hospital was only 10 while in 1900 the average number was 35.

In 1902 the Board of Managers purchased three acres of land, adjoining the Medical School, from Harvard University, and it is here that the new building has been erected.

In 1904 the managers adopted the plan of including in their annual reports brief statements from the members of the Staff, giving information as to work done by the Hospital, the idea being to give a more accurate as well as a more adequate record. These records, as planned, were not to be scientific contributions of interest only to the profession, but practical statements for the information of laymen as well. This plan has been carried out and exhaustive reports in reference to work done, medical contributions, changes from time to time in the medical staff, additional departments, and various other measures by which the efficiency of the institution would be increased have been recorded.

The Hospital was the first in the country to establish at its Wellesley Convalescent Home a country branch giving to sick children the therapeutic benefits to be derived from fresh air. The Hospital has educated and trained a large group of skilled practitioners who have formed an alumni association.

In addition to its remarkable pioneer work on the immunization of diphtheria the medical staff has done much original work. To be mentioned are the modern methods of feeding, extensive Roentgen work on development and on studies connected with the time of emptying the stomach. The work in connection with the treatment of cerebrospinal meningitis is especially to be noted. Long periods of treatment of this disease by the administration of diphtheria antitoxin in one series of cases and lumbar puncture in another prepared the way for the serum treatment which has been and is so thoroughly and intelligently carried out in its wards. Lumbar puncture was first done on a series of patients in 1897 but the Flexner serum was first used in 1907.

In connection with the remarkably efficient corps of pediatricians forming the Pediatric Department of Harvard University the Hospital has rendered great aid to the complete and noted organization of this department and has opened its wards for a free study of Pediatrics to both students and practitioners. More continuous teaching is probably done in its wards than in any other hospital in the country.

The successful work of the Hospital has justified the efforts of the founders and those who have so willingly contributed to its maintenance and warrants an appeal for generous support in the future.

The writer wishes to state that he has been greatly assisted in writing this report by Dr. A. G. Helmick of Columbus, Ohio, senior house officer during his service. He is much indebted to Dr. Helmick for the large amount of work which was necessary to bring these facts, connected with the hospital, together.

III.

The History of the Children's Hospital with Especial Reference to the Orthopedic Department.

By R. W. Lovett, M. D.

The Children's Hospital was founded in July, 1869, and began in a very small way, treating only 12 medical and 18 orthopedic and surgical patients in the five months of the first year's activity. The staff consisted of three physicians and three surgeons, the latter being Drs. Francis H. Brown, S. W. Langmaid and John Homans. In the year 1870, however, it may be seen that the work was still very light, for only 30 medical and 39 orthopedic and surgical patients were treated in that year. In 1874 an out-patient department was opened.

In 1877 Dr. Francis H. Brown retired as surgeon, and was replaced by Dr. William Ingalls, who had been up to this time one of the

physicians. In 1876 Dr. Homans retired from the staff, and his place was taken by Dr. E. H. Bradford, who began then a service as surgeon which terminated only with his retirement in June, 1912. In this service of nearly thirty-five years he saw the hospital rise from its very small beginnings to an institution of national reputation, and in this progress he was one of the important factors. No one else has had so long a connection with the staff.

In 1879 Dr. Arthur T. Cabot was appointed assistant surgeon, and he became surgeon in 1882, a position which he held until his resignation in 1889. Dr. Brown and Dr. John Homans were made consulting surgeons in 1879, and Dr. Ingalls in 1880. Dr. Abner Post was appointed assistant surgeon in the same year.

In 1883 the hospital moved to the building on Huntington Avenue, at that time a modern, capacious and up-to-date hospital, which has now become so wholly inadequate to the present demands on it. In the first year in the new building, however, only 178 orthopedic and surgical cases were treated. In this year Drs. F. S. Watson and H. L. Burrell were appointed assistants in the surgical out-patient department.

With the move to Huntington Avenue there began what one might call the modern history of the hospital, that is, a rapid expansion in its work and usefulness. For example, in 1883 there were treated in the wards 299 patients and there were 1488 out-patients, while in 1903, twenty years later, there were treated in the wards 1505 patients and in the out-patient department there were 6341 new patients.

Dr. Langmaid resigned as surgeon in 1885, and was made surgeon to the throat department in the following year. Dr. Post became surgeon in 1886, and Dr. Watson resigned, while Dr. Burrell was made assistant surgeon. Dr. H. W. Cushing was in this year made an out-patient assistant. In the year 1887 Dr. Post resigned, Dr. Burrell took his place as surgeon, Dr. Cushing became assistant surgeon, and Dr. R. W. Lovett became out-patient assistant.

In 1889 Dr. Cabot resigned as surgeon, and his place was not filled. Dr. Burrell remained as surgeon till his death in 1910, and his place as surgeon was filled by Dr. James S. Stone in 1912. Dr. Bradford resigned in 1912, and was succeeded by Dr. R. W. Lovett. Other members of the present orthopedic or surgical staff are as follows: Associate surgeon, Dr. Augustus Thorndike, connected with the department since 1897; assistant surgeon, Dr. Robert Soutter, becoming a member of the assistant staff in 1903; junior assistant surgeons, Dr. Albert Ehrenfried, appointed in 1910, Dr. Arthur T. Legg, appointed in 1908, and Dr. James Warren Sever, appointed in 1908. In the department of general surgery the junior assistant surgeons are Dr. Charles G. Mixter, connected with the hospital since 1911, and Dr. William E. Ladd, appointed in the same year.

In the intervening years the roll of other names connected at some time with the orthopedic or surgical work of the hospital as members of the assistant staff is a brilliant one. These names are Dr. E. G. Brackett, Dr. J. E. Goldthwait, Dr. John Dane, Dr. E. H. Nichols Dr. R. B. Osgood and Dr. Z. B. Adams.

In 1903, by an arrangement made between Drs. Bradford and Burrell, the surgical service, which up to that time had been indiscriminately orthopedic, and general surgical, was divided into two divisions, one orthopedic and the other general surgical, Dr. Bradford taking the former and Dr. Burrell the latter. This division proving eminently an advance, it has been continued as a permanent division of the work.

The orthopedic service has shown the benefit of this division and the consequent better specialization in its own work by an increase in the volume of its work, and in the productiveness of the service. In the six years ending in 1912 this department contributed to literature three text-books and 91 articles in periodical literature. It gives 300 hours of clinical teaching to the students of the Harvard Medical, beside eight courses to graduates.

The orthopedic service is an active one, and in the year 1913 each orthopedic bed was occupied on the average 23 times in the year. Compared with a similar hospital in another city devoted largely to orthopedic cases, each bed in that institution was occupied five times in the year 1911. This efficiency of service is made possible only by the use of the Convalescent Home at Wellesley, opened in 1875, which has been maintained since then by the Ladies' Aid Association of the hospital, who have thus for some thirty years contributed so greatly to the advance of the hospital.

The growth of the orthopedic service may be shown by the fact that in 1913 the orthopedic operations numbered 423, an increase of 60 per cent. over the number in 1906, and in 1913 the orthopedic admission showed an increase of 41 per cent. over similar admissions in 1910, the figures of which happened to be available for comparison.

If the progress of the past offers any basis for judging, we may look forward to a great institution. In 1870, the first full year of the hospital, there were six medical men on the staff, no out-patient department, and 83 patients were treated. The running expenses were about $6,000. In the year 1912, thirty-two years later, the members of the consulting, visiting and assistant staff numbered 46, the visits to the out-patient departments numbered 26,500. 1,729 cases were admitted to the wards, and the expenses were $54,800. With the financial support of the public in maintaining the new hospital we may well see that a more rapid rate of enlargement and usefulness lies ahead of us in every department in an institution so admirably equipped as the one to which we are soon to move.

IV.

THE WORK OF THE CHILDREN'S HOSPITAL IN 1913.

BY JOHN LOVETT MORSE, M.D.

THE work of the Children's Hospital has increased steadily from year to year in spite of the fact that the accommodations for the treatment of patients have remained the same during recent years. During the year 1913, 1,750 patients were admitted to the wards. These were distributed as follows:

Medical	569
Surgical	522
Orthopedic	569

The daily average of patients in the hospital during the year was 70. The large number of patients admittted compared with the number of beds was rendered possible by discharging the patients as soon as it could be done without injury to them and by sending them to the Convalescent Home in Wellesley to regain their strength.

One thousand six hundred and forty-one operations were performed during the year. These were divided among the various operating services as follows:—

Surgical	483
Orthopedic	422
Throat Department	736

The operations, both on the surgical and orthopedic services were, of course, of the greatest variety. Those of the throat department were largely the removal of adenoids and tonsils, although many more serious and difficult operations were performed by them also.

The medical out-patient department is open daily, in the morning. The surgical and orthopedic out-patient clinics are held four times a week, in the afternoon. The clinic for nervous diseases is held twice a week, in the afternoon, and that for diseases of the throat, three times a week, in the afternoon. There is also a special clinic for the treatment of lateral curvature four times a week. A special clinic for the treatment by muscle training of neurological cases and of orthopedic cases suffering from paralysis has also recently been established conjointly by the orthopedic and neurological departments. This clinic is held four times a week, in the afternoon. The number of patients treated in the out-patient department was as follows:——

New patients in out-patient department	6059
Medical	2416
Surgical	1193
Orthopedic	957
Lateral curvature	64
Nerve	327
Throat	1102
	6059

Whole number of visits made	27,153
Medical	8006
Surgical	4319
Orthopedic	6893
Lateral curvature	2896
Nerve	3038
Throat	2001
	27,153

A very important department of the hospital, and one which is absolutely indispensable to the orthopedic and surgical services, is the surgical appliance shop. This department manufactures all the apparatus which is used in the treatment of orthopedic and surgical cases both in the wards and in the out-patient department, and also does a certain amount of work for other hospitals and outside physicians. It has eight employees and during the year did a business aggregating nearly eleven thousand dollars. The shop supplies the apparatus at very nearly cost, thus saving the patients considerable amounts of money.

The social service department has been even more active during the last year than ever before; 696 new cases were referred to the department during the year. These, added to the number carried over from 1912, make a total of 1500 families with which the hospital has been kept more or less closely in touch. The number of visits made was 3075.

The school of nursing is of very high grade. The course is for three years. The school is of the first rank, meeting the requirements of the Board of Regents of New York state. Its graduates are eligible for membership in the Massachusetts State Association and in the National Association of Trained Nurses.

The amount of instruction given by all the departments both to physicians and undergraduates in medicine has steadily increased. Physicians come to the hospital for instruction from all parts of the United States and Canada, as well as many from foreign countries. The students in the third and fourth years of the Harvard Medical School are in the wards almost daily. The value of the instruction given in this way can hardly be overestimated, since it extends the usefulness of the hospital far beyond its walls and to many children who have never seen or heard of it. A special series of lectures was given by the orthopedic department to

physicians at a minimum fee during the year, and a series of free clinical lectures by all the departments of the hospital to the Boston school nurses and the nurses of the Instructive District Nursing Association.

V.

ORTHOPEDIC SURGERY AT THE BOSTON CHILDREN'S HOSPITAL. A REVIEW OF THIRTY YEARS OF CONTINUOUS SERVICE.

BY E. H. BRADFORD, M. D.

THE progress in the development of the science and art of orthopedic surgery in the past thirty years has been reflected in the work in that department of surgery at the Boston Children's Hospital.

In addition to this, valuable experience has been collected from the work of the many trained observers at the hospital, and as a result deductions have been made and methods of treatment tried, rejected or accepted.

A complete review of the work would be unnecessarily detailed but a condensed statement of conclusions which seem justified may be of service.

TUBERCULOUS AFFECTIONS.

One of the most gratifying changes in the last 35 years in connection with the Hospital is that shown in the great improvement in the results obtained in the treatment of the tuberculous bone and joint affections.

Anyone who can recall the pitiful condition of the cases brought for hospital care in the early days, and their unsatisfactory state when discharged, will view with much satisfaction the results of treatment observed at present. It cannot be claimed that the ultimate goal has been reached, and much greater benefit will undoubtedly be recorded in the next generation, when more thorough measures of combating the invading disease, or strengthening the patient's resistance, have been discovered, but a more surprising improvement is to be recorded now than that formerly possible.

This is due to several factors, viz., greater skill in the early diagnosis of cases; more systematic and thorough treatment carried on continuously for as long a period as is necessary, and greater care in the stage of convalescence.

TUBERCULOSIS OF THE SPINE.

Dr. Sayre's boast, that there will be no more hump-backs, appears to have been justified by the results obtained when careful treatment is feasible. Certainly the cases brought to the in-service at the Hospital do not now show the distressing deformities which were the rule 30 years ago. There appear also to be fewer resulting abscesses than was the case formerly.

Improved methods of fixation on recumbency frames permitting rest without imprisonment, and locomotion with protection from jar, including head and trunk fixation by plaster and leather jackets, efficient appliances which increase the cures within the control of the surgeon. It may be said now to be a demonstrated fact that no case of caries of the spine where an early diagnosis is made and proper treatment furnished for a sufficient length of time need develop a noticeable deformity; but for such a thorough treatment and such satisfactory results not only a mastery of details is needed, but also a control over the care of patients for a relatively long period. Such a course of treatment does not necessitate hospital detention or even special skill in nursing but the care of a mother or nurse capable of carrying out the required directions. In fact, the care by an intelligent mother may be superior for these cases to that of an overworked nurse whose ward duties may interfere with detailed oversight and attention to important details.

For a choice between ambulatory treatment and recumbency, or locomotion with protection by plaster of Paris jacket fixation, braces with or without head supports, as well as for a selection of the form of brace or the method of application of plaster jackets, the surgeon is guided by the means at his command and the circumstances of the case, as well as by nursing and environment at command. The employment of brace without adequate skill in their design or application does not lead to the best results. Recumbent treatment without fresh air is objectionable. Plaster jackets improperly applied or used without judgment are both untidy and inadequate.

The following suggestions are to be kept in mind. The purpose of all treatment being to keep the diseased bodies from being bruised together by the superimposed weight, recumbent treatment is the best method, unless the disease is situated in such a part of the spine that it is possible to throw the superimposed weight more upon the firm and undiseased portion of the spine, *i.e.* the articular processes, and to prevent all motion forward at the diseased portion of the spine, or at least to limit it to such a degree that no injurious bruising occurs.

Manifestly, rigid recumbent treatment is more needed in a case when a large region, including many bodies is attacked than where only a small focus or an area surrounded by firm bone is diseased. In recumbency it is necessary to arch the spinal column forward and for this a firm pad (sawdust bags are the most serviceable) on a firm but not too hard surface is needed. This is adjusted to the back at the level of the disease and can be made to serve well if the recumbent

frame holds the patient in place. A plaster of Paris posterior shell, applied when the patient's spine is pressed forward at the diseased point, gives a back support to which the patient can be well secured. In children it is well to place them upon the usual bed frame in addition, to prevent the twisting of the spine by leg kicking.

In cervical caries, head traction, and in psoas contraction, leg traction, is needed, but the amount of pull should not be great when an increasing abscess is to be feared.

Details as to the various methods of applying jackets, or of the braces used must be left to the judgment of the surgeon. Certain common errors are to be avoided, viz., in plaster jackets, the omission of a head or neck support; neglect to carry the jacket down far enough in front; the application of a jacket which holds the patient forward rather than throws him back; or which does not throw the spine back at the point of disease; the application of braces, which do not exert adequate forward pressure at the point of disease, or do not hold the spine firmly enough either because of too light material, or from improperly applied straps.

In the question as to the length of time when recumbency or protective treatment is needed the surgeon has no guide but his own judgment. The presence of muscular spasm, the guarded movements of the patients when free from support are indicative of the instinctive need of support or protection. This differs from the feeble movements of a child just released from recumbency, or from a jacket or brace.

The X-Ray shadow is not an absolutely reliable guide in directing the treatment of spinal caries and the possible release from protection, even where satisfactory pictures can be taken.

New, firm bone may be present although penetrable by the rays, as in the case of the patella, which is often not shown in a front view of the normal knee joint.

That excellent results can be obtained with permanent cures without deformity, with recession of deformity, has been abundantly proved by the Hospital records. The subsequent history of cases severely attacked in childhood have in some instances been known in adult and married life, with the birth and growth of healthy children.

The operative treatment in Pott's Disease consists in opening the abscess and, recently, in the attempt at spinal fixation by bone graft and periosteal flaps.

In regard to the treatment of abscess, it can be said that sound practice seems to consist in abstention from incision as long as the abscess does not increase, or occasions no harm. Complete absorption of some large abscesses has been observed in many instances. But this conservatism is to be supplemented by radical treatment where incision is necessary. This should not only be free, but carried out so as to allow free discharge as near the original source as possible. To aid in this the surgeon will find a large steel uretheral sound of use in finding, and as a guide to the proper points of incision. Multiple incisions in the back, side, and front are often needed to drain a psoas and lumbar region properly. In some instances, costo-transversectomy is needed to drain an abscess in the post mediastinal region, which caused distressing and alarming attacks of dyspnoea. The operation is not difficult, though it is sometimes not easy to palpate and tap the abscess after the opening through the thoracic wall has been made, if the abscess is well forward on the front of the vertebrae.

The injection of germicides into abscesses in Pott's Disease without provision for drainage has not found favor in the Children's Hospital wards. A few unfavorable cases may have prejudiced the observers.

The attempt to ankylose the back of the spinal column by bone transplantation, or by causing ankylosis of the spine, is so recent a procedure that sufficient clinical evidence has not yet been secured to justify a critical estimate of the permanent value of a method. It certainly seems to promise much in shortening the period of treatment.

TUBERCULOUS DISEASE OF THE HIP.

What has been said as to the results now obtained in tuberculosis of the spine can be repeated with equal truth in regard to tuberculosis of the hip.

There is less deformity, fewer abscesses, and less bone destruction in the cases sent into the in-service of the Hospital for treatment, than was formerly the case. Much better results are obtained now than formerly.

This has been shown in the statistics of the results in cases treated in the Children's Hospital, five or ten years after the end of treatment as compared with the former results, and there is reason to believe that at present even better results can be expected.

The problem, however, of the treatment of hip disease is not a simple one, but requires more thought than the treatment of caries of the spine with modifications to fit the varying conditions. Operative interference, attacking the bone in caries of the spine is admittedly impracticable, but in the hip, the natural inclination of the surgeon is to shorten the difficulty by radically eliminating the disease by excision, erosion, removing tubercular foci. The experience of the Children's Hospital in the past 30 years, after a careful trial of both operative and conservative methods, coincides with the experience in many other clinics, in the opinion that where conservative methods can be systematically carried out, which, with proper organization of Hospital, out-patient department, out-door relief, convalescent country homes, are entirely possible —much better results follow than if the eradica-

tion of diseased foci is attempted by operative measures. Surgical Tuberculosis of bone is a constitutional disease with local manifestation. Surgical intervention should be directed to meet the local indications, preventing bone bruising, pain, deformity,—promoting drainage of detritus, and the reparative bony healing, almost sure to occur if fresh air and as much activity as the lesions permit. To cage children in beds, in hospital wards, in heavy plaster bandages preventing locomotion, are measures which may be necessary for a time, but the time should be as brief as possible and, fortunately, in a large majority of cases in children, unless the disease has reached an advanced stage, the time of imprisonment need be short. The surgical indications for prevention of deformity, bone trauma can be met while the patient enjoys comparative freedom in locomotion.

The tuberculous bone process as has been abundantly shown in pathological specimens, not being rapid in its progress, permits and stimulates a conservative bone reaction in the adjacent tissue which if conditions are given, eventually heals. This healing is delayed by injury to bone tissue, as is inevitable in operative surgical interference involving bone destruction. Such interference may be at times necessary when the carious detritus can not escape and acting as an irritant, promotes progress of the disease, where the amount of detritus is too great for absorption, and where no escape is possible. The true *vis medicatrix* in hip disease, as in tuberculosis elsewhere, is the antidote which Nature furnishes in an improved environment. Naturally more can be expected in the way of recovery in children than in adults, both because the reparative power is greater in the former, and a longer period is needed for repairs, and because it is more easy to control favorable conditions of environment for children than for adults.

Early excision; excision of the acetabulum; partial excisions; channeling for foci; are not procedures which are to be recommended for tubercular disease of the hip in children, according to the experience of the Children's Hospital.

As a life saving measure in neglected cases amputation at the hip, in extensive pelvic disease, has been done 4 times in the early period of the Hospital, when more neglected cases were brought for treatment. In one, the patient was known to live to manhood, enjoying excellent health. In two others, death from amyloid disease followed several months after recovery from the operation. In a fourth, the ultimate result was not known.

Operative dislocation of the hip, to relieve interarticular pressure in advanced acetabular disease, was performed three times with benefit and in one instance, the case was followed to adult life, a complete cure resulting with deformity not yet corrected, but perfectly correctable by osteotomy.

The present routine treatment at the Children's Hospital consists of a bed frame, and traction during the acutest stage, the early application of the abduction traction splint which furnishes better fixation, allows more locomotion, and less bone atrophy than a plaster spica bandage; the use of this with crutches during the florid stage of hip disease followed by a perineal crutch, and weight bearing gradually permitted, according to the progress of the disease toward recovery.

Increasing abscesses are incised, existing deformity corrected either under an anaesthetic or by pull; osteotomy being reserved for healed cases with deformity.

Under such treatment subluxation should be prevented, abduction and flexion also, though in rapidly growing children the prevention of these, especially a flexion deformity, demands protection and limitation of weight bearing for a long period until the epiphyseal bone has regained the required firmness.

TUBERCULOSIS OF KNEE, ANKLE, SHOULDER AND ELBOW.

The conservative treatment of these cases in children seems justified in preference to the operative removal of bone, other than sequestra or detritus. Plaster and leather fixation, with a Thomas knee splint for the knee and ankle, with fixation for the elbow, eventually give as satisfactory results as can be obtained. The course of treatment is, however, regrettably slow, and the use of some methods of early constitutional cure, besides that which comes from protection from trauma and the natural power of repair of the individual, is much to be desired.

These affections are treated successfully on the same principles mentioned in regard to treatment of caries of the spine and hip disease, but the treatment is modified by the varying anatomical and physiological conditions. In the upper extremity the problem of weight bearing being removed, the treatment is simplified, in the shoulder, the drag of the weight of the arm prevents bone crowding, but the spasm of the strong pectoral muscles draws the arm to the side, and furnishes the indication in fixation for an angular axilla pad.

KNEE—ANKLE.

In the lower extremity Thomas' well-known splint, with its modifications is of recognized service, but it should, in the acuter stage, be supplemented by plaster of Paris or leather fixation.

Radical operative excision should never be resorted to in tuberculous disease of the knee in growing children.

In disease of the ankle, subperiosteal removal of an extensively diseased astragalus sometimes shortens the course of the affection but statistics have appeared to show the best results following

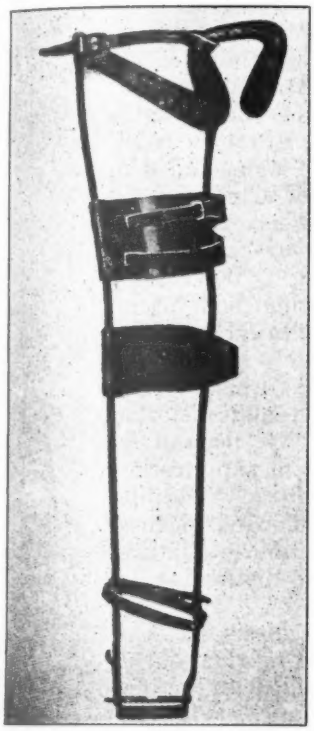


FIG. A.—Abduction traction splint padded. (Bradford.)

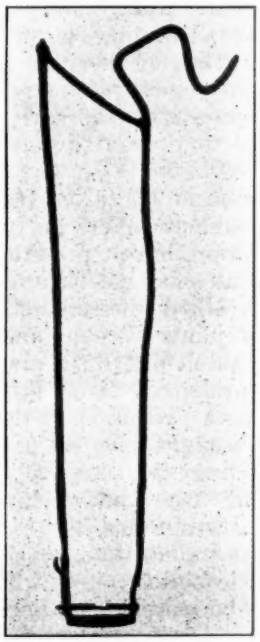


FIG. B.—Abduction traction splint without padding or straps. (Bradford.)

FIG. C.—Child wearing the abduction traction hip splint. (Bradford.)

FIG. 10.—Rear view of the abduction traction splint applied. (Bradford.)

FIG. E.—Model showing trunk fixation by traction applied.

FIG. F.—Model showing lack of fixation when traction is not applied.

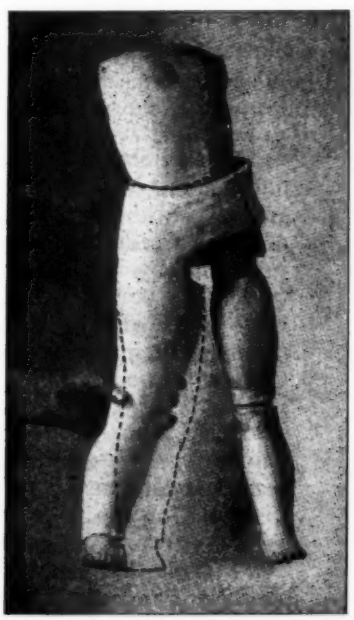


FIG. G.—Model showing lack of fixation of hip-joint by plaster spica from the necessary looseness at the pelvis and trunk.

conservative protective treatment, *i. e.*, plaster bandage fixation and a Thomas splint to prevent the injury from weight bearing, in locomotion.

FRESH AIR TREATMENT.

In all tuberculous affections of the joints the chief reliance for cure must, at present, be placed on the tonic of absolutely fresh air whatever may in the future come from vaccine or serum therapy.

The statistics of the Convalescent Home of the Children's Hospital have demonstrated clearly not only that fresh air is beneficial in tuberculous bone cases as in tuberculous affections of the lungs, but that it has a tonic value. Hospital cases removed to fresh air shacks increase in weight, appetite and color; while the physiology of this is not clear, the fact can be regarded as demonstrated.

It would appear that sea air is not superior to that of the fields. It is important that the air should be fresh during the night as well as the day.

OSTEOMYELITIS FROM PUS-MAKING GERMS.

Thirty years ago the distinction between the different forms of caries of the bone were not known and as the relation between osteomyelitis and certain germs had not been studied, the fact that the pathological history of the affection caused by the invasion of the tubercle bacillus differed from that caused by the irritation of the several forms of cocci, or that the latter differed was not understood. While the matter is as yet one which demands much more investigation, enough is known as to the two groups of bone infection to base different policies in treatment.

The fact that as a rule osteomyelitis from the pus causing cocci attacks the diaphysis, and that from the tubercle bacillus involves the region of more rapidly growing bones; the epiphysis or juxta epiphysis, *i. e.*, the diaphysis at its junction with the epiphysis is sufficiently established to be accepted as a rule, with exceptions, and indicates that in the slower developing tuberculins more attention needs to be paid to the prevention of deformity than where the marrow of the shaft is attacked, with its stronger and less rapidly growing and less rapidly cicatrizing bone. In the cocci group of osteomyelitis the indication for drainage is the chief one, whereas, in the tuberculous osteomyelitis the chief purpose of the surgeon is to put the tissues into such a condition that the reparative process may obliterate the destructive otitis.

In fulminating cases of osteomyelitis the indications are clear, viz. the region of invaded bone should be found, incised, and the bone drilled. High temperature and blood count are to be observed with marked constitutional symptoms and usual local oedema, or swelling at the point attacked.

In the arthritis of infancy, so called, an acute affection, the pathology is not well understood, except that joint destruction, especially of the hip occurs rapidly and suppuration takes place and the invading germ is not the tubercle bacillus, but of the pus-causing group of cocci.

Speedy operative interference is demanded in these cases with the early use of a traction appliance to prevent deformity where the hip is involved.

The form of caries following typhoid fever or pneumonia offers an interesting field for investigation, but at present the clinical course of these cases has not been adequately studied, nor has an allied, distressing ailment where several of the joints become ankylosed and distorted after an attack of acute severity, marked by pain, prolonged fever, but without suppuration. The cases presented at the Children's Hospital have brought records of a prolonged sickness resembling in some of its clinical features typhoid fever, but lacking the distinctive intestinal symptoms.

Cases of multiple bone tuberculosis, cases of mixed infections, *i. e.*, where an original tuberculous bone lesion has been invaded by the pus-forming cocci, and suppurating osteomyelitis has resulted, with such sequelae as to make the original nature of the affection uncertain, have naturally been not infrequent, indicating the need in the future of carefully recorded details of the initial condition of the patient.

It may be said that the prognosis of these cases in children is surprisingly good, when favorable nursing conditions can be furnished.

RACHITIC DEFORMITIES.

As the Children's Hospital has been for many years the chief clinic here for the treatment of rachitic deformities it is to be expected that marked progress has been made in the different methods of treatment in this most common affection.

Formerly, operations upon bone were regarded as a dangerous undertaking, and children were subjected to a tedious treatment with heavy and cumbersome apparatus, with but little prospect of substantial improvement in resistant cases.

The introduction of aseptic measures has made osteotomy safe; osteoclasis is easily performed, and simple appliances adapted to younger and less resistant cases are of service. The X-Ray enables the surgeon to determine the character of the deformed bone, and a more careful and extended knowledge of the clinical history of cases, made possible by large and well organized hospital clinics, have taught that in a large majority of cases the tendency is to a rectification of the deformity in growing children if the conditions favoring help are given. All this com-

bined makes the treatment of these deformities a matter of no great difficulty.

Modifications of the Thomas knee splint can be made for use at night for such young children as require correcting pressure; light walking, correcting appliances can be used where necessary in deformities not suitable for operation and with threatening increase of curves, as a rule cases older than 4, with marked curves should be operated on. Osteoclasis by means of an osteoclast is more precise than manual osteoclasis, and osteoclasis is a simpler operation than osteotomy and therefore preferable in bow-legs. Osteotomy is preferable where correction near the knee or hip is required as in knock-knee and coxa vara. Subcutaneous osteotomy in skilled hands can be made as precise as through a skin incision and is preferable as being simpler. Linear osteotomy, and no further injury of the periosteum makes blood clot healing certain, and if the bone is divided three-fourths through the shaft and the rest broken, the interlacing fibres of the periosteum secure speedy bone healing and allow proper rectification of deformity. Perfect allignment is not necessary, but correction permitting weight bearing in an improved position is followed by further rectification through normal growth.

Anterior tibial curves can be treated without wedge-shaped bone exsections by linear osteotomy of half of the bone and strainghtening, with blood clot healing of the resulting gap, with or without tenotomy of the tendo Achillis to overcome the bow-string tension on the curve.

Experiments have shown that linear section of a part of the bone is made by osteoclasis. The bone cracks cleanly on the side opposite to the pressure with slight tearing on the proximal side; there is no danger of splintering or shearing in long bone. In osteotomy properly done the clean section is at the point of attack by the osteotome, and any irregularity in the division occurs where the section is completed by manipulative correction. Danger to the arteries and nerves is reduced to a minimum in osteotomy if the osteotome is driven directly through the nearest point to the bone cortex and by manipulating the osteotome the bone undermined from the inside until complete fracture is possible by manual force. A small osteotome will be found preferable over a large one by a surgeon used to the procedure.

In some instances manual correction of rhachitic curves will be found more easy if the limb has been bandaged by a plaster bandage, worn for a month. Bone atrophy takes place. There is, however, no advantage in this method of procedure over osteotomy.

Of the various forms of osteoclast the well known Rizzoli's appliance has been found reliable and practicable in the clinic. Simple and effective also is a modification of Little's osteoclast.

After correction, the limb, protected by cotton wadding, or a soft bandage, is held in plaster of Paris fixation for a few weeks, after which as a rule the bone is firm. It is advisable that the plaster bandag · be bivalved so that the front of the limb may be inspected at will by the surgeon without disturbing the position. If the plaster bandage is a broken one this can be done without weakening the fixation of the fragments and the surgeon may reassure himself as to the position of the fragments and the proper correction of the deformity.

PARALYTIC DEFORMITIES.

In no branch of orthopedic surgery has there been so surprising an improvement as in the treatment of the deformities of anterior poliomyelitis.

The former treatment consisted simply in the endless and unbeneficial application of Faradic electricity and massage, and awkward and, in the main, useless appliances with the aid of tenotomy of the tendo Achillis in a few instances.

Improvements in appliances have enabled the surgeon, through purely muscular treatment, to secure improvement in the weakened but not paralyzed muscles by the exercise given in locomotion with light appliances permitting, as far as possible, motion in all directions except in the direction of deformity. The essential in paralytic affections of the lower extremity is to place the child on its feet with frame, crutches, or other appliances giving it the sense of locomotion and activity. Deformities are easily corrected by tenotomy, aided by osteotomy in extreme cases, with forcible corrections, and in some cases open incision.

POLIOMYELITIS.

It is an interesting fact in the history of medicine that an interest in the study of poliomyelitis should have been developed acutely and suddenly all over the medical world in the last five years although the ravages of the disease itself have been common always, and there is no reason to think that the affection is more prevalent now than heretofore. It is to be hoped that renewed investigations will bring forth remedial measures which will control our surgery of deformities. It is also singular that this affection was almost ignored in the medical instruction of fifty years ago, except a mention of what was classed as teething palsy, or infantile paralysis.

The treatment of the deformities of poliomyelitis if described in detail would demand a volume in itself for adequate presentation, as the manifestations vary greatly, and much persistency and some ingenuity are needed to furnish the substantial practical relief which may often be given by the surgeon in the correction, the prevention of deformities, and in the utilization of damaged limbs.

A brief statement of the principles involved in the measures to be selected may serve to illustrate the advance made in the last 30 years in combating this affection.

The disease itself displays in most instances at first a marked effort for recovery, for 6 months or a year, and later a tendency to develop deformity from the enforced misuse of the damaged limb. The position in which a dangling limb is held, from constant or gravity position, strains certain weakened muscles and permits contraction of unopposed muscular groups. The superimposed weight falls faultily upon the damaged foot and makes a distortion which becomes permanent with growth. Although at the outset only certain muscular groups are permanently paralysed, many muscles being weakened, and others impaired in their strength by a lack of use, the principles of treatment demand, when it becomes evident that no recovery is to be expected in the muscular groups inevitably damaged, giving such freedom to the limb as may approach the normal and develop strength in supplementary muscles to make up for deficient function.

In the correction of deformity the measures needed are simple: gradual or forced stretching of the contracted muscles, aided or not by tenotomy, myotomy, ar even osteotomy, as may be necessary, in order to give the most favorable, useful bearing alignment of the bony structure possible.

Apparatus of the simplest character which is effective is to be furnished to aid proper weight bearing and to check contraction of an unopposed group of muscles.

For the partial restoration of functional activity the employment of muscle transference is of great value and the use of artificial ligaments to check the flail joints has proved of great value.

In cases where no muscles are left unparalyzed and muscle transference is impossible, stiffening the joints by partial excision of the cartilaginous surface, or in paralytic calcaneus, the removal of the os calcis and slipping the foot back, thus checking heel drop are successful procedures.

The details of these measures would form a chapter in themselves. Here can be recorded the fact that few cases of infantile paralysis of a lower extremity need remain unrelieved. Complete restoration of function is not possible, but the children can be freed from imprisonment, to a wheel chair.

SPASTIC PARALYSIS.

Little's Disease was formerly treated by massage and appliances as it was regarded as a central nervous affection, cerebral paralysis with a lesion in the cortex. The neurologists considered surgical treatment irrational and absurd, but empirically orthopedic surgeons proved the contrary, Dr. Gibney of New York and the surgeons at the Boston Children's Hospital being among the first.

It is now known that tenotomy and myotomy, or muscle paralysis surgically induced, followed by muscle training, presents a feasible method of treatment followed by benefit.

The affection being one of disturbed muscular balance the temporary paralysis of the muscles with exaggerated muscular spasm and the development of the overpowered muscles, accompanied by appliances making locomotion possible and correcting a tendency to a relapse of the deformity, is always followed by improvement, in cases that are not mentally defective. Experience has shown that there is a tendency to a gain of muscular control in all these cases if a stimulus to muscular effort is furnished. The removal of deformity removes an impediment to muscular exertion.

Correcting appliances without tenotomy are of little use in these cases. A long after-treatment, muscle training, is to be expected.

Alcohol injections paralyzing the nerve, bringing an exaggerated impulse in addition to the measures correcting the deformity, has appeared to be of advantage, but the exact value of the procedure is still *sub judice*.

Cutting the posterior roots in children who can be helped by milder measures is with our present experience not justified. The mortality of the procedure in children, cannot be disregarded except in the severest cases

ANKYLOSING ARTHRITIS. ARTHRITIS NODOSA.

While degenerative arthritis, the degenerative changes of middle life or old age, the spavin of animals is not seen in children, an affection often confounded with it though pathologically different is occasionally seen in a distressing form in children. It is polyarticular and in this differs from joint tuberculosis. There is usually a painful stage, there is disability and distortion.

While a scientific method of treatment of ankylosing arthritis has not yet been developed many cases at this hospital has shown improvement and in some of the milder cases recovery after a system of treatment directed to the correction of the deformity, steadying the limbs if in the painful stage by plaster of Paris bandages, using apparatus, there is recurring deformity and apparatus, with treatment stimulating the circulation locally; greater improvement in methods of treatment may be hoped for if advances in bio-chemistry succeed in throwing more light upon the nature.

Although this affection has been much studied under different names and has been supposed to be of a tonic nature, the exact nature of the toxin has not yet been established, nor in fact that it was not due to some defect in mentabolism, *i. e.*, an anti-intoxication.

While it is more frequently seen in adults

(in the writer's experience in women) some of the most pitiable cases occur among children, even in infancy.

In other instances the affection appears in children in a much milder form and is followed by gradual recovery, apparently aided by the treatment.

After it became established that certain joint tissue change affections and disabilities result from a degenerative process in contrast to the destructive inflammatory carious processes caused by the entrance of definite germs, it appeared that the treatment needed was to stimulate the tissues rather than to promote tissue atrophy from rest and fixation.

Where active inflammation is not present, the amount of use should be all that is practicable within the limits of discomfort and violence or the trauma of strain. Gradual use under proper proportions is beneficial, aided by such measures as stimulate the circulation, *i. e.*, massage, especially vibratory massage, dry heat, electricity, static, the intermitent current, hydrotherapy, passive exercises, but especially active exercises, weight bearing, carefully directed.

An unexpected amount of improvement will often follow these methods of treatment persistently carried out, accompanied by proper attention to metabolism.

This combined with corrective or prevention of deformities and the protected use of the limbs guided from strain if necessary by crutches or light apparatus, form a practicable system of treatment which must serve until increasing knowledge may furnish a most positive method of cure.

CLUB FOOT.

The treatment of congenital talipes equino varus 40 years ago was successful in many instances, but the methods were clumsy and the need of thorough after-treatment was not recognized. Relapse and incomplete correction was too commonly the result.

The morbid anatomy was not well understood. The Scarpa shoe formerly much used may be taken as an appliance imperfect for correction and impossible as a walking shoe in after-treatment. Removal of the cuboid, astragalus, and wedge-shaped excision of the tarsus, all mutilating procedures, had been occasionally employed and even amputation performed in resistant cases.

At present all cases of club foot from infancy to adult age are to be regarded as curable without mutilation and with the restoration of normal function. It is, however, necessary to meet certain definite indications fully and thoroughly.

The affection is a congenital displacement of the bones of the foot chiefly at the mid-tarsal articulation, with adapted alteration in the soft tissues, ligaments, tendons, and in the shape of the cartilage and bone in the joint surfaces of the astragalus and os calcis. Roughly, the deformity may be regarded as a congenital inward subluxation at the mid-tarsal articulation.

Treatment in brief consists in the gradual or forcible correction of the misplaced bones with retention in an overcorrected position for a sufficient length of time for the cartilage, ligaments and muscles to adapt themselves to the normal positions so that the correction becomes permanent.

In infancy under three months, repeated plaster of Paris correction without tenotomy, and in children in arms with tenotomy of the tendo Achillis, and in older children with tenotomy of the tendinous insertion of the tibials, plantar fascia as well, enables over-correction of the deformity. This over-correction should be maintained for several months, and should be followed by some apparatus to ensure normal walking, for in young children a turn in gait leads necessarily to relapse.

Proper walking braces worn inside the shoe, holding the foot in an exaggerated valgus position are often needed. On the sole of the boot a high wedge pressing up the cuboid will correct intoeing in walking if the varus has been fully corrected.

In resistant cases it is sometimes necessary to remove a wedge-shaped piece of bone from the neck of the os calcis and of the astragalus, sparing the articulation to secure proper overcorrection. It is especially important that the cuboid be placed in a normal position, otherwise relapse is sure to follow even if apparent correction has taken place. A club-foot wrench will be found of great assistance in the more resistant cases.

TORTICOLLIS.

The improvement in the treatment of wry neck, *i. e.*, the deformity due to contraction of the sternomastoid, is the result of the aseptic method in surgery. In the preaseptic days the surgeons dreaded the danger of pus in the deeper fascia and subcutaneous tenotomy was the operative procedure employed to divide the contracted muscle. This division was not easily performed thoroughly on account of the neighboring large vessels. Contracted muscles partially divided do not permit satisfactory results; much was left by the surgeon to after-treatment and heavy appliances were used in these half cured cases. When open incisions became safe cures of torticollis were more readily accomplished. The contracted muscle is to be thoroughly divided, the distortion, forcibly over corrected, the head held in an overcorrected position for three months by a plaster of Paris bandage, or by this followed by a light but efficient correcting appliance. There are several methods for the division of the contracted muscle. The one preferred by the writer is an incision carefully made parallel to the clavicle, a few lines above it, with complete division of the sternal and clavi-

cular insertions, a director having been inserted under the tendon to protect the vessels which lie deeper. It is rarely necessary to divide the scaleni for even when contracted they may be forcibly stretched sufficiently.

A complete permanent cure should result.

CONGENITAL DISLOCATION OF THE HIP.

IN the investigation of methods of care of an affection hitherto regarded as incurable, the Children's Hospital has been active for thirty years, from the time of the premature announcement of a cure, afterwards followed by a relapse, by Buckminster Brown by the means of traction applied continuously for a long period, and the first attempt, apparently but not actually successful, by Post of Boston at manipulative reduction. Subsequently the reduction by open incision was performed with a fair percentage of success in a number of cases. Hoffa, of Berlin, operating upon one, and later the method of manual forcible reduction, the Paci Lorenz method, was employed, (several operations being performed here by Lorenz.) The first thoroughly efficient mechanical appliance for reduction introduced by Mr. Bartlett, was employed in a large number of difficult cases with success and finally a careful study of the pathological anatomy of two children dying of contagious disease, before and after operation, made the pathology of the affection clear and the methods of treatment and their indications precise and definite.

At present it may be said that the deformity is an eminently curable one.

These cases can be divided into two classes: dislocated hips with an open, and with a narrow capsule. Originally in infantile cases, as is shown by pathological specimens, the capsule is open and loose, the head can be easily placed in or pushed out of the acetabulum. The defect consists in the absence or relaxed condition of the cotyloid ligament and zona orbicularis, which even in a full term foetus is strong enough to hold the femoral head in the socket.

After the child has walked upon the limb, as the body weight falls upon the capsular ligaments and not on the bone structure of the socket, the capsular ligaments become altered in shape and structure, the capsule extending to the upward displaced head is stretched across the acetabulum. In the older cases the capsule tissue becomes firm and resistant and the head can not be replaced in the acetabulum but is pressed against the drum-head-like tissue consisting of the capsule stretched across the acetabulum. The replacement consists in forcible widening of the narrowed capsular opening between the head and the acetabulum and stretching any obstacle which may oppose and pushing the femoral head into the bottom of the socket without folding the capsule in front of the head. To avoid the latter, the lower part of the capsule should be put under tension when replacement is attempted and to facilitate the reduction the head should be manipulated so as to press in the lowest portion of the acetabular rim (*i. e.*, behind and at the middle.) Shortened muscles can be stretched or relaxed by placing the limb in a flexed and adducted position. Forcibly abducting the flexed limb with pressure on the trochanter presses the femoral head against the tightened capsule and if favorably placed forces it into the socket.

In the cases with an open loose capsule little or no difficulty is encountered in the reduction; in tough, tense, and distorted capsule some force is needed. When the capsule is too firm and narrow to be entered by force, reduction by incision is necessary as the capsular contraction needs to be divided as in the reduction of an incarcerated hernia.

Reduction by incision is rarely needed in young cases, but in the more resistant cases, the procedure has resulted most satisfactorily. Forcible reduction can ordinarily be performed by manual manipulation under an anaesthesia, but in the more resistant cases, when much force is needed to stretch the capsule contraction, mechanical force is an important aid; first, to hold the pelvis firmly, second, to exert traction to stretch the capsule, and third, to apply forcible pressure, driving the head of the femur through the contracted capsule opening.

After the reduction the head should be held in place for a sufficient time for the capsule to form firmly about the femoral neck, that the head may be held in place. Plaster of Paris fixation for several months after a thorough reduction ordinarily ensures a cure which is permanent, as the Hospital statistics at the Children's Hospital have shown.

COSTUME DEFORMITIES.

The fact that growing bone could be altered in shape by pressure constantly applied was not unknown 40 years ago, but that the slight pressure of clothing could alter the shape of growing children was not realized. As is well known now definite faults in shape can be traced as a result of clothing. Round shoulders, weakened neck muscles, prominent clavicles, hollow chest, result from an overgreat drag upon the shoulders caused by the pull of elastic side garters attached to children's waists. Undue abdominal pressure from tight waists, corsets, weakens the abdominal, back and loin muscles. Growing girls should wear loose garments with no shoulder drag or abdominal constraint.

SHOE DEFORMITIES.

The extent of the deformities of the foot from shoe wearing is not generally realized, but a comparison of the baby's foot and that of an adult who has never worn shoes with the foot

of any individual who has worn even ordinary footwear since infancy will demonstrate the fact that the habitual compression of the foot, even only to the extent of the amount of pressure of what are termed comfortable shoes, causes muscular atrophy and the loss of normal muscular foot power. When "stylish" shoes are worn, compressing the front of the foot, or simply checking its proper spread when full weight and the exertion of the back drive of the foot comes upon it, the foot becomes in time distorted.

The foot placed firmly upon the ground, if a heel is worn on the shoe, tends to slide forward and this tendency is increased in the speed of walking. The front of the shoe is always narrower than the spread foot and the toes are necessarily crowded into this narrower space. The stiffness of the sole prevents normal toe flexion, and the fact that the upper is always fitted snugly to the dorsum of the foot to diminish wrinkling of the leather as the shoe is worn, hampers normal play of the foot and checks toe flexion. The stiff shank adds to the crumpling of the foot, and an unstretchable seam across the dorsum of the foot, pressing with a strong pressure on the dorsum of the foot, checking the sliding of the foot forward at each step, exerts a cramping pressure.

The result is that the foot which, as an implement of locomotion admirably adapted by the varying movement at its different articulations to the different conditions and activities of locomotion, is cramped for the greater part of the day in a firm and partially stiffened box.

The part of the foot which is the first to suffer is what may be termed the thumb action of the 1st metatarsal which is lost early. The flexion clutch of the toes, the spread of the front of the foot, muscular strength of the muscles of the sole of the foot and the adductor and flexor muscles of the toes all are impaired, crowding and crumpling of the smaller toes and hallux valgus, a flattening of the transverse arch are frequently developed and by the friction of shoes, bunions, corns, and exostoses. The development of static pes plano valgus usually known as flat foot is the most common result of shoe deformity and it may range from a slight functional weakness to a fixed deformity.

For the full details of treatment for the correction of these deformities and affections more space is required than can be furnished in this publication. That all these ailments, little understood thirty years ago, are entirely curable is well established. The most important element in treatment and in prevention is the removal or avoidance of the cause, viz., faulty foot wear. This indication is clear when it is known that these affections are not known among moccasin-wearing or bare-footed people, while extremely common among urban people with the more snugly fitting shoes. Young children, when it is not possible for them to be barefooted, should wear as much of the time as is possible moccasins or sandals and at all other times should be furnished with broad toed, loose shoes. Adults, when clumsy shaped, loose shoes are not feasible, should wear as much as possible as a rest to the foot, loose, flexible foot-wear. When walking, or using the feet a great deal, broad toe shoes should be used and conventional shoes only when the feet are not to be used actively.

Measures to strengthen the foot muscles, muscles of the sole and the correction of existing deformity are essential for a cure.

Stiff shoes, flat foot supports are to be regarded as temporary measures to prevent ligament strains. Faulty attitudes in standing and faulty use of the foot in walking are to be avoided by training.

STATIC AND ACQUIRED DEFORMITIES OF THE FEET.

A Children's Hospital does not offer adequate clinical material for a complete study of those acquired deformities of the feet which are more commonly seen in adults than in children. For a thorough understanding of the subject, however, a knowledge of the varieties of human gait and the normal action of the feet is of assistance. This is more readily studied in infants and children than in adults, as continued shoe wearing develops a more or less pathological condition.

An observation of a large number of children's feet shows that in the feet of even comparatively young shoe-wearing children a definite amount of loss of muscular strength is often produced in a majority of cases, together with toe crowding. Toe crumpling may be developed in stocking and shoe wearing children even when not more than three years of age. Investigation has shown that most acquired and static foot deformities (in cases not complicated by trauma, congenital defects or paralysis) are in reality shoe deformities. Investigation has also shown that the normal foot in infancy varies in shape (except as to the length of the second toe) according to race and is true to a type which it would appear has not changed since the prehistoric man.

Although these acquired deformities are much more common in adults than in children, no one can master the subject who has not familiarized himself with the shape and functional activity of the feet, both in shoe-wearing and barefooted children.

TREATMENT OF SCOLIOSIS.

The treatment of scoliosis forty years ago was both unscientific and clumsy to a degree that it could hardly claim a place in the proper domain of rational surgery characterized as it should be by knowledge, judgment, and good sense.

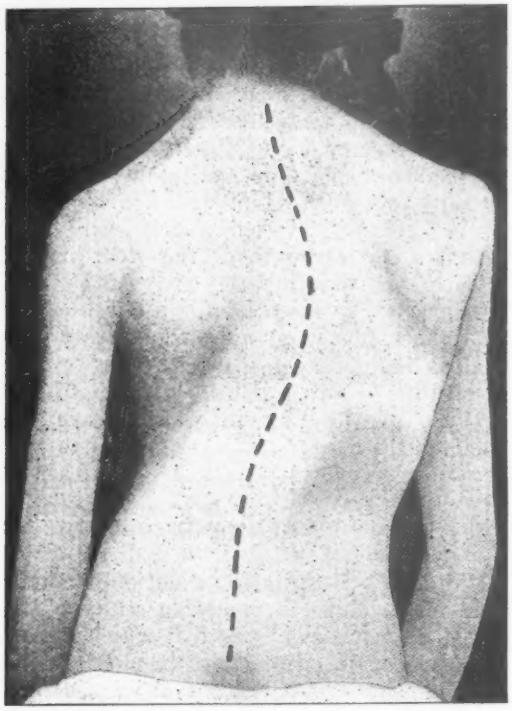


FIG. X.—Resistant lateral curvature in a girl of fourteen before treatment with plaster jackets.

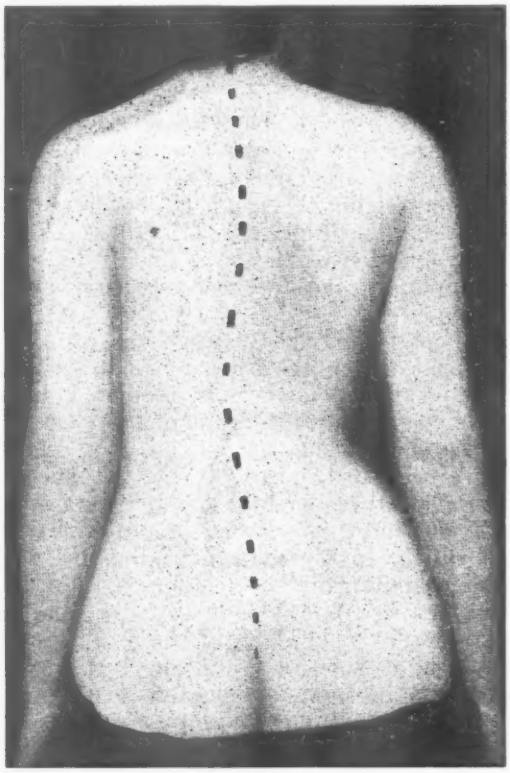


FIG. Y.—Case of scoliosis before application of brace.

The subject was clouded by ignorance as to the true nature of the affection, lack of thoroughness in the methods employed and a lack of definite purpose as to the result sought.

Much satisfactory earnest work has of late been devoted to the subject and it may be added that at present the treatment of scoliosis and spinal curves presents one of the most interesting and satisfactory problems in the field of surgery but one which differs from most surgical questions in that the cure can in no way be hastened by the use of the knife and the course of the affection before a definite cure is established is tediously chronic, involving months and years of observation, beside such time as is necessary for treatment. The affection being a vice in growth, a tendency to relapse exists in many cases during growing years and these years the spine may assume different degrees of variations of distortions according to the amount of resistance of the patient and the varying determining conditions. The resulting spinal curves may be classed as those presented by the weak backs, the curved backs and the twisted backs. The former is characterized by a constant drooping of the spinal column with exaggerated physiological or abnormal curves, which may be voluntarily corrected by the patient, with a tendency to relapse if the patient is tired or remains for any length of time in a sitting or standing position. In the curved backs this condition is complicated by some structural change in the tissue to such a degree that the patient cannot by voluntary effort correct the abnormal curve although in the milder cases these curves can be straightened by pressure of the surgeon's hands.

In the twisted backs the curves are complicated by a twist of the column due partly to the rotation of the individual vertebrae because the superimposed weight forces the vertebrae to twist to the side, as the spine is twisted sideways and partly because the strained ligaments become stretched and offer less resistance to the superimposed weights in one direction than in another, and partly because the muscles pulling on the ribs, the patient being in a curved attitude, twist the column abnormally.

The treatment must necessarily vary according to varying circumstances. Formerly, as it was difficult to control conditions for a sufficient length of time, the satisfactory results were not obtained and many surgeons frankly relegated treatment to gymnastic teachers as the only practical method to be advised.

As the conditions developing these deformities are constantly in the erect position, and as gymnastic exercise could only be practiced for a limited period, the benefit to be derived from gymnastics treatment was limited to the milder cases perhaps capable of improvement under better health conditions or freedom from constricting clothing or faulty school seating.

A step in the study of the disease, was a more rational comprehension of the pathology of the curves and twists. When it became clear that the curves result from changes in a spinal column unable to bear the body weight without yielding with the structural changes resulting

from this inability due to lack of general muscular tone or local weakness and lack of resistance of tissue, a more definite system of treatment became possible. The introduction of plaster jackets did away with the belief that treatment necessarily consisted in general spinal couches and heavy steel corsets, and induced energetic surgeons to turn their attention to the subject of correcting the distorted trunks. But before determining the best method of applying mechanical means to untwist the spine, it was necessary to demonstrate that a pressure upon the projecting ribs acted not simply on the costo-vertebral articulation but the vertebrae itself so that if the pressure were properly applied it could tend to correct an abnormal twist. This has been clearly proved by Dr. Soutter and Dr. Keene.

The effects of abnormal muscle and fascia pull has been carefully studied. Experiments in Germany and here have demonstrated that spinal curves could be developed in growing puppies if fixed for a few months by plaster of Paris bandages in a twisted position. Experiments here also showed the effect of superimposed weight in developing a spinal twist with vertebral rotation and rib prominence. The pathological changes in bones of curved spines has been thoroughly studied. Much study has also been devoted to the normal movement of the spinal column with the result that the informed surgeon is in a position to apply principles deduced from a series of well observed facts to the rational treatment of cases of spinal curve.

Whatever different theories may be presented as to the best methods in treating lateral curvature, all will agree that the whole treatment of structural scoliosis does not consist of or end in the correction of the curve.

Many surgeons have suffered the disappointment of finding a relapsed deformity after a complete correction or over-correction of congenital equinovarus and the probability of recurrence in a corrected curve and twist is even greater in lateral curves than in corrected deformities of the foot, for it is more easy to control the deforming conditions in the latter than in the former class of distortions.

Spinal curves dependent upon vices of growth due to static causes, faulty weight distribution, distorted muscular, or anatomical defect, will tend to recur during the growing years, until the tissues have gained in strength of structure sufficient firmness to prevent yielding to the ever-present force of superimposed weight.

There should therefore not only be vigilance in the inspection of such cases with accurate methods of recording observations at stated times, enabling the surgeon to recognize a threatened relapse, but also measures for the counteraction of such a tendency in an early and more manageable stage.

To apply corrective jackets for a few months or a few years, remove these and leave the patient to take chances of future normal growth, with only as protection from relapse a reliance upon occasional gymnastics and waist bindings, removable braces or jackets, can not be regarded as thoroughly scientific surgery.

Of the various ways of recording scoliosis, there are advantages in selecting one which can be accurately and quickly made, requiring no more skill than that furnished by an office attendant.

The glass plate tracing method offers the advantages of simplicity and accuracy, and can be obtained if a proper diopter is used, and the patient suitably fixed.

A transparent celluloid sheet set in a frame has the advantage of lightness over the glass plate; an ordinary, four post iron piping frame with side pelvis clamps furnished fixation with an inexpensive apparatus. An inexpensive diopter can be made by using a small wooden block, properly squared and of a size to be held in the hand, with a piece of tubing attached at one end. The surgeon looking through the tube of the diopter placed upon the upright transparent celluloid plate, close to which the patient's bared back rests, can carefully follow lines and contours without the error of change in the position of the eye, from a line vertical to the plane of record. If a pencil which can mark on glass is so placed in the block of the diopter that its marking point would strike the recording plate in the center of the inspection tube, an accurate record can be traced on the celluloid plate, from which it can be traced on tracing paper, and kept as a permanent record of contour lines of shoulder hips, the position of the points of the scapulae, and the line of the marked spines. A record of flexibility can be made if the patient with the shoulders are kept flat to the plate and the body bent sideways to either side, and the line of the marked spines traced.

The value of this flexibility test is greater than might at first be supposed.

An examination of a number of these indicates considerable variations in the flexibility of different parts of the column and enables the surgeon to determine the local increase or diminution of spinal flexibility under exercising treatment and hence beginning relapse, and the urgency of a need for the employment of measures to prevent stiffening at any special part of the spine.

Antero posterio curves need for this record a special means of tracing, for diopter tracing fails on account of the projection of the scapulae. This is obviated by using for the tracing of the back the method recommended by Wollenburg, by which the shape of the trunk as seen from the side can be noted.

The accuracy of these tracings by diopter has been abundantly demonstrated as well as the ease with which they can be taken.

It would appear that this method of testing the lateral flexibility of the spinal column is of use, enabling the surgeon to determine func-

tional defects in the spinal column not recognizable by the unaided eye, by the X-ray, or by photograph. An examination of a number of these records show a marked difference in lateral spinal mobility, which when not due to changes in bone structure, as is probable in many cases, though recognized with difficulty, indicates structural changes in the ligamentous and muscular tissue in different parts of the column, changes which can, in favorable cases, be overcome by treatment.

For recording rotation, various methods are offered for the surgeon's selection. The angle record, indicated in the accompanying illustration, is simple and the angle of rotation more easily noted than in the one more commonly used.

Photographs, pantagraphic records of cross sections of the thorax, are all of assistance, but the method mentioned has been found simpler and of satisfactory accuracy.

A record of the strength can be simply made without the employment of elaborate strength test apparatus. A record is kept of the number of times certain prescribed exercises (using dumb-bells of a certain weight) can be performed. This record can serve as a table and an index of increasing strength; multiplying the weight of the dumb-bell by the number of the exercising movements, a strength index can be noted. The exercises to be noted in such a record will vary with the spinal curve, and its muscular weakness. Recumbent dumb-bell exercises, using the movements frequently prescribed for the correction of scoliosis, will serve as a basis for a strength record as well as for systematic muscular development needed in the after-treatment of lateral curves.

The great difficulty in rational treatment encountered in cases of structural scoliosis,—is in the application of such means, as, after correction of the deformity, will prevent the assumption by the patient of faulty attitudes, without at the same time causing muscular weakness of the trunk muscles, and without being so unsightly or cumbersome as to prevent constant use for the long period needed in growing children. A rigid leather or celluloid jacket, or the ordinary back brace does not meet the complex stature conditions involved in faulty attitudes, where the surgeon with a moderate pressure of his hand can rectify a deformity, and yet hesitates to encase the trunk in a stiff corset binding the waist, necessarily weakening the muscles and inefficient in correcting rotation.

This difficulty is usually side stepped, the surgeon prescribing daily exercises, relying upon these for preventing relapse.

Exercises, however, can only be rigidly enforced for a comparatively short period each day, while the need of measures to counteract the static influences causing relapse, is in many instances constant when the patient is erect.

Various appliances have been devised, and none are entirely satisfactory,—an indication that the subject needs further investigation.

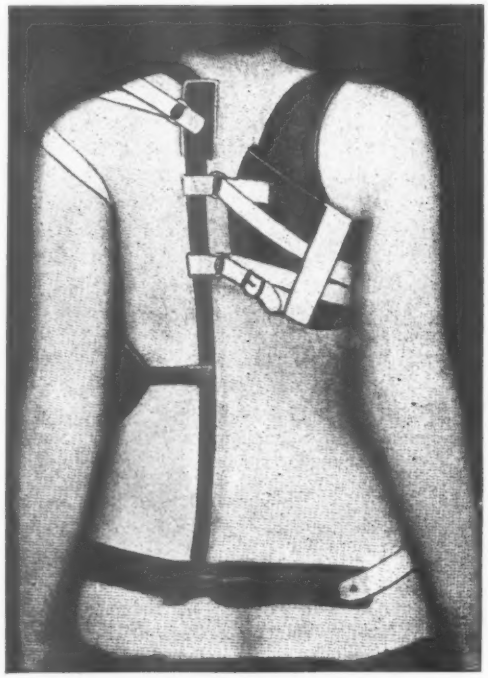


FIG. M.—Brace applied.

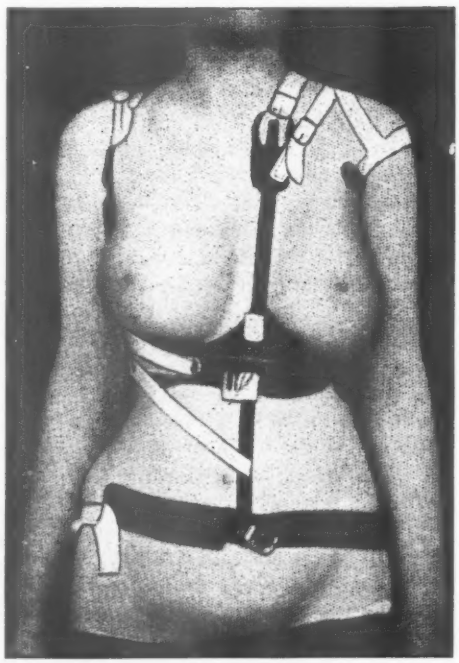


FIG. N.—Brace applied. Front view.

It is manifest that there is need of pressure and counterpressure in various directions, and that this pressure be as effective as possible it should be applied exactly where the curve extends toward the upper part of the spinal column. It is mechanically absurd to apply

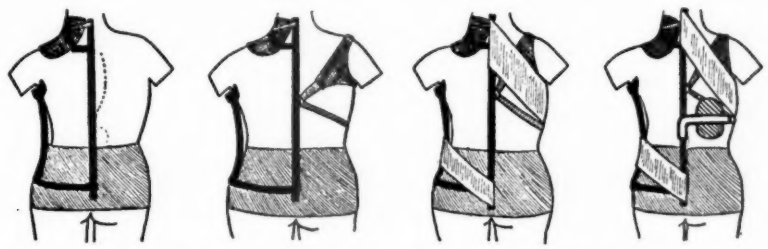


FIG. O.—Diagram illustrating check brace. 1. Showing steel upright side, crutch pelvic, and neck leather. 2. Same with shoulder strap. 3. Same with side correcting bands. 4. Same with rotation pressure pad.

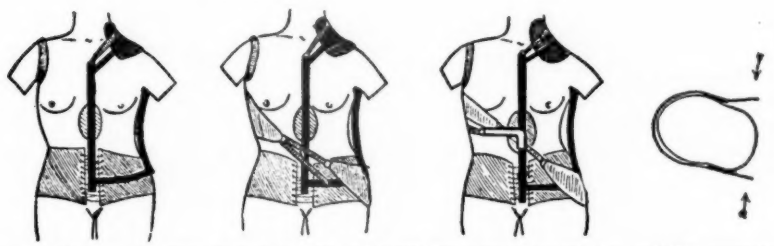


FIG. P.—Diagram of brace as seen in front with out-line showing points for rotation correction.

correcting pressure only or chiefly on the lower part of the trunk and where the column twists and it is desirous to check this. Any corset which twists with or around the trunk is inefficient.

It is better to frankly leave the patient to the correcting forces of nature than to use inefficient measures, which cause discomfort and even injure. But if the surgeon leaves scoliotic curves to chance, he must expect relapses in many cases.

It is of the first importance in a reliable check brace, meaning by this an appliance which will check a slump to faulty attitudes, that it should fit the pelvis at the hips, in order that it should not twist. This can be satisfactorily furnished if a cast is taken, and leather is stretched around such a cast. A base for counter-pressure, both lateral and diagonal, is in this way furnished, and the tendency to slip around the trunk checked.

A leather collar can be moulded at the neck for the upper point of counter-pressure, extending down to the shoulder, but, as this has a tendency to project with the patient's movement, it is better to rely upon a strap for counter-pressure, where it is important to avoid unsightliness or a conspicuous brace. A steel rod connecting the upper and the lower points of counter-pressure serves to furnish a line for lateral pressure. This should be secured to a cross-band attached to the leather around the pelvis, and should be stiff enough not to twist.

A light steel crutch, reaching from the pelvis to the axilla on one side, prevents the riding upward of the brace, and checks the patient's tendency to drop a shoulder.

Points for counter-pressure being furnished at the neck and pelvis, side correcting pressure is needed upon the ribs at the region of greatest deformity. This can be arranged by a broad strap fastened to the steel upright at a desired point; can if secured by a strap to the pelvis leather be made to exert any desired amount of counter-pressure.

Where one shoulder is held high with projection of the scapulae, this can be checked by means of a shoulder strap, which passing around the back uprights is secured in front, pulling the shoulder back and down.

In front the neck and the pelvis leather should also be connected by a steel upright to give steadiness, and, if furnished with a leather pad, can be made to exert pressure upon the front projecting ribs.

In a majority of such cases, it is also necessary to check rotation of the ribs. This must be done by pressure, exerted in such a way that it will not also compress the flattened parts of the chest.

Cross steel straps attached to the uprights and furnished with pads can be arranged like a clamp to press upon the projecting ribs without crowding the depressed portion of the trunk.

An appliance of this character needs careful adjustment at first, but can be regulated by the patient or nurse, and does not interfere with activity, and is not noticeably disfiguring. It will prevent the patient's tendency to slump into a faulty attitude. As it is removable, it can be worn only for such a portion of the day as is necessary to correct the greatest tendency to slump, or it can be used constantly, removed only during the gymnastic period. It furnished the maximum amount of pressure with the minimum amount of injurious muscular constriction.

As there is comparatively little objection on the part of the patient to a light apparatus of this character, correction can be employed as

long as may be required in the child growing period.

Little need be said here as to special muscular exercises needed in these cases as so much has already been written upon the subject. It is sufficient to say that bumb-bell exercises, if properly directed, can serve excellently for special muscular development by daily home exercises; they can be simple and suited for home direction.

Something more than muscular exercises and check braces are needed in the more obstinate of these cases.

A constant tendency of certain ligaments to lose elasticity exists when faulty attitudes are constantly assumed. This danger of adaptive change in ligament and fascia is to be counteracted by daily correction or over-correction of a faulty curve.

This can only partly be effected, and in some instances not at all, by muscular exercises, and should be made when the muscles are relaxed in order to overcome muscular resistance. Correction of this sort must be accurately applied, and should be of such a character that it may be made a part of the daily home routine.

An arrangement indicated in the accompanying illustration will be found to have certain advantages for home correcting exercises.

It consists of an oblong piping frame with cross cloth straps for head, shoulder and pelvic rests for the patient, who kneels head downward in the frame; side straps with weight pulls to keep pelvis and trunk in a correcting direction, and by means of a lever with pressure attachment the twisted thorax can be over-corrected at any desired section. The amount of correcting pressure can be easily regulated.

This arrangement for daily correction can be used also in the application of corrective plaster jackets, and it will be found of advantage for this purpose in many cases, especially in the higher curves.

The avoidance of conditions favoring faulty attitudes is advisable in the after treatment of spinal curves, corrected, or in the earlier stage of development.

The avoidance of sitting for long periods without the interruption of a period of active play, the enforcement of a period of flat recumbency or the prone position to rest the back muscles, serve as an aid to prevent a habit of faulty attitudes. Lounging in large, or deep, or broad seated chairs, is to be avoided, as it favors a twisted attitude. Expensive, especially made chairs, are not necessary. A narrow seated stool or chair with proper attention to the length of the legs can answer for study or any occupation requiring a seated position for some time.

Night corrective appliances are as a rule not necessary for cases of structural scoliosis after the stage of plaster-of-Paris correction, nor in the slighter flexible cases. If this is not the case, the appliances mentioned can be worn as a night appliance with but slight alteration and padding to protect the night clothing. It is not more uncomfortable than a plaster jacket.

Certain facts are to be held in mind by those treating cases of fixed spinal curves.

The best method of correction is by properly applied plaster jackets. But correction of the curve is not curing the patient and gymnastics are adjuvants in treatment, but not to be relied upon exclusively when a relapse is threatened.

Check braces are of assistance if they prevent slumping and faulty attitude. Such braces should be efficient and prevent slumping of the spinal column and the assumption of faulty attitude and not be waist or thorax compressing corsets.

As there is a tendency to relapse during growth, inspection and treatment may be needed for a long period. As the patient has rights, ugly, heavy disfiguring appliances should not be applied for an indefinitely long period.

To be honest with himself the surgeon should in watching the most chronic of surgical ailments keep accurate records and measurements of contour, flexibility, curve and rotation to enable him to detect relapse definitely and to note gain positively.

PLASTER OF PARIS JACKET CORRECTION.

Sayre's plaster of Paris jacket proved of unestimable value in the treatment of caries of the spine, but the benefit obtained in scoliosis from head suspension and plaster jackets applied in this position was not so marked; but it has been abundantly demonstrated that a steady pressure correcting and constantly applied will correct curves in scoliosis and that a properly applied plaster jacket furnishes a suitable means for such pressure.

Various methods have been suggested for the suitable application of jackets, and as the curves vary considerably, difficult methods of application will be needed.

Manifestly the maximum of endurable pressure should be exerted upon the convexities in the trunk while no pressure should be placed upon the hollows, which will gradually expand in respiration if freed from pressure while the rest of the chest is compressed.

The best method of application of plaster jackets are those giving the patient the least discomfort, the surgeon the greatest convenience, while placing the patient in such a position that correction will not present unnecessary obstacles, *i. e.*, the patient should be recumbent rather than standing, that the superimposed body weight should be eliminated as a factor. Whether the best position is with the patient upon the back, face or side, depends largely upon the seat of the curve, high dorsal, low dorsal; lumbar; in the higher curves a position upon the face seems preferable and in the lower upon the back, in the higher curves the jacket

should reach above the shoulder on the side of the dropping shoulder.

The writer has found the kneeling position of service, the shoulders and pelvis being fixed with side pressure correcting curves and strong pressure upon the most prominent part of the deformity with counter-pressure arranged as needed.

No difficulty is met with in providing any amount of correcting pressure; the patient's endurance is the limit of feasible application.

Removal jackets are much less effective than permanent ones as means of correction, but they become necessary where the maximum amount of correction has been reached to prevent muscle weakening by daily exercise.

Removable leather jackets exerting constant correcting pressure, and light supporting braces are effective but not disfiguring, and worn for a long time make with proper gymnastics a systematic treatment possible, continued through the growing years if necessary. The nature of the treatment will depend upon the progress of the case which can be determined by careful records. It is to be remembered that while the bones of the spinal column are lacking in resisting structure and bear the superimposed weight of the body and while faulty attitude persists either from an anatomical defect or from habit or muscle weakness, after correction of curves, recurrence must be guarded against.

A KNOWLEDGE OF THE USE OF APPARATUS.

An obstacle to the more general study of the special branch known as orthopedic surgery has been the need of readiness and skill in the prescribing and applying suitable apparatus. This is not absolutely necessary in practice.

The surgeon can correct deformities by operative measures or by the use of plaster of Paris bandages, and be entirely independent of the instrument maker. At the same time in a large number of cases better results can be obtained as in other branches of surgery if the orthopedic surgeon is thoroughly familiar with the best implements for the readiest accomplishment of certain desired results.

The first essential in an apparatus is that it should be efficient, *i. e.*, that it should meet the mechanical indications in the most direct and thorough way.

The second requirement is that it should be as comfortable to the patient as possible.

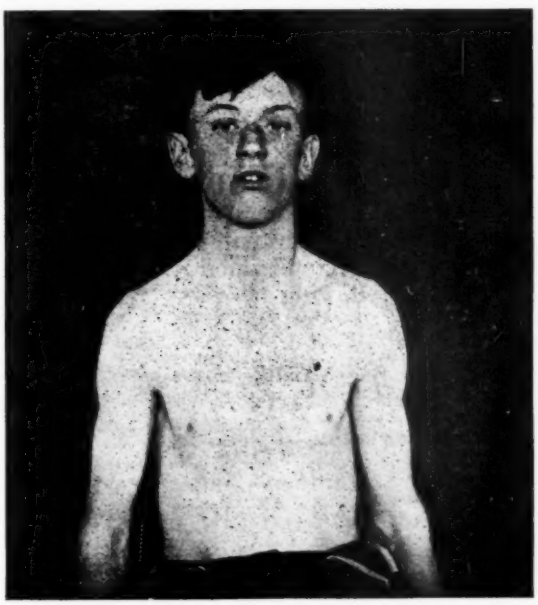
A third, that it should be simple and readily applied by the attendant, nurse, or mother.

Great improvement has in the last 30 years been wrought in the simplification of appliances and at present the experience in our hospital clinic, where the orthopedic appliances used are made under the surgeon's direction, will give the necessary knowledge.

A surgeon, however, who has not mastered the details is as poorly equipped in his art as an artist who has not mastered his palette. The surgeon needs to be able to adapt apparatus to the need of the individual case.

In practice there is a natural tendency at a large clinic to neglect the careful use of appliances, which require some experience and skill, and to rely on the use of plaster of Paris bandages, the application of which are often relegated to a subordinate, or are more easily applied than is the case with apparatus. There is to the mind of the surgeon, as ordinarily trained, a prejudice against the use of apparatus with joints, straps, and buckles. This prejudice is not only unfounded but based largely on the supposition that a knowledge of the use of appliances is something which is with difficulty acquired. Although plaster of Paris bandages have many advantages they are not without marked disadvantages, and no one undertaking the practice of orthopedic surgery should fail to familiarize himself with the careful use of appliances.

The early establishment of a shop in direct connection with the Hospital with workmen under the control of the surgeon proved of great advantage in the treatment of deformed children at the Children's Hospital.



No. 44.—Torticollis, right.

Driscoll, age 5. Date of admission, Aug. 28, 1896. Date of discharge, Sept. 3, 1896. Duration, 3 years. Since birth. Operation, Aug. 28, 1896. Incision, myotomy, plaster. Result 10 years later.

A retrospect like this would be incomplete without a few words as to the probable future of orthopedic surgery as a specialty. It was certainly justified itself in the past by its record of advance in the care and better treatment of a considerable number of affections previously regarded as practically incurable or treated with great difficulty. But the question is pertinent whether in the future the prevention and

cure of deformities will not form a part of the work of the general surgeon. Specialization is to be condemned unless justified by definite reasons; surgery is surgery-healing by means of the skilled hand. But there is a great difference in the skill needed by the operator who attempts to overcome a disease by a surgical feat and that required in the management of cases where special treatment is needed, for months or even years, before, after or in place of an operation. It is doubtful if any surgeon can become a leader in both fields at once. Orthopedic surgery will, it would seem, retain its place as the surgery of chronic cases.

Ambroise Paré is right in his famous saying,—that the surgeon was but a dresser, as healing was in the hand of the Deity; but in correcting deformity, the surgeon must often match his skill against an errant nature, using the laws of growth against the faults of growth.

VI.

INFANTILE SCORBUTUS.

BY JOHN LOVETT MORSE, A.M., M.D.

THERE has been a rapid and progressive increase in the number of cases of scurvy coming to the Medical Out-Patient Department of the Children's Hospital during the last four years. This increase has been not only absolute but also relative to the total number of cases, as is shown by the following table:—

TABLE I.

Year.	Number of New Cases.	Number of Cases of Scurvy.	Percent.
1904	2,579	3	0.11%
1905	2,533	11	0.43%
1906	2,288	4	0.17%
1907	2,075	7	0.33%
1908	2,407	6	0.24%
1909	2,062	5	0.24%
1910	2,311	11	0.47%
1911	1,967	12	0.61%
1912	1,932	13	0.67%
1913	2,416	21	0.87%

An analysis of the foods taken by the babies suffering from scurvy during the last ten years was then undertaken to determine, if possible, the cause of this increase. The data in the records were, unfortunately, in many instances, incomplete. The food taken by these babies at the time of the appearance of the first symptoms of scurvy is shown in the following table. No data as to the food was given in the others.

TABLE II.

Condensed milk mixed with water or gruel	4
Proprietary foods mixed with water	14
Proprietary foods mixed with milk—raw	1
pasteurized	1
boiled	7
no data as to heating	7
Proprietary foods, no data as to milk or heating	10
Milk, plain, diluted with water or cereal diluents, or modified—pasteurized	5
boiled or scalded	23
no data as to heating	14
Breast-fed	3
Total	89

A summary of the above figures shows that 18, or 20%, were fed on "stale" foods, that is, condensed milk or proprietary foods mixed with water. 44, or 50%, were fed on either proprietary foods or condensed milk. In the 37 cases in which milk was used either with or without proprietary foods and data given as to whether it was heated or not, the mixture was given raw in one, or 3%; pasteurized in six, or 16%; boiled, scalded or sterilized in 30, or 81%. It is probable that the milk was boiled in at least one-half of the other cases in which milk was used with proprietary foods, because the directions on the can containing the food used in these cases call for boiling. It is also probable that in a considerable proportion of the cases on modified milk prepared at milk laboratories the mixture was pasteurized.

It would appear from these figures that proprietary foods, "stale" foods and the heating of milk to the temperature of pasteurization or higher, may all play a part in the etiology of scurvy. The fact that three cases developed in babies taking only breast-milk shows, however, not only that no one of these can be the exclusive cause, but also that there must be some other cause. The most striking fact in these figures is, however, that 54 of the 58 cases, or 93%, in which there are data as to the "freshness" of the food, were fed on foods which were not fresh, that is, containing either no milk or cooked milk.

It was thought that a comparison of the feeding of the individual infants in a year at the beginning of the investigation and in the last year might show something as to the cause of the increase in the frequency of the disease. The following table shows the foods taken by these babies in 1905 and 1913.

TABLE III.

1905.

1. Mellin's Food. No data as to milk or heat.
2. Modified milk. No data as to heat.
3. Modified milk. No data as to heat.
4. Malted milk. No data as to milk or heat.
5. Mellin's Food mixed with condensed milk and water.
6. Sterilized milk, shredded wheat, oatmeal, barley.
7. Condensed milk and oatmeal gruel.

8. Malted milk and barley gruel.
9. Malted milk and water.
10. Mellin's Food with milk and water. No data as to heat.
11. Breast.

1913.

1. Modified milk. Boiled.
2. Modified milk. Boiled.
3. Modified milk. Heated. Temperature not given.
4. Milk and water. Boiled.
5. Milk. Boiled.
6. Nestle's Food. No data as to milk or heat.
7. Modified milk. No data as to heat.
8. Milk and barley water. Sterilized.
9. Mellin's Food, milk and water. Made with pasteurized milk.
10. Condensed milk.
11. Eskay's Food, milk and water. Boiled.
12. Milk and water. Boiled.
13. Eskay's Food, milk and water. Boiled.
14. Breast.
15. Modified milk. No data as to heat.
16. Milk and water. Boiled.
17. Modified milk. 155° F.
18. Mellin's Food, milk and water. Boiled.
19. Milk and barley water. Mixed hot.
20. Modified milk. Made from pasteurized milk and boiled.
21. Milk and water. Scalded.

It appears from these figures that the proportion of babies fed on the proprietary foods in 1913 was much smaller than in 1905. It hardly seems reasonable, however, to draw the conclusion from this fact that babies fed on milk are more likely to develop scurvy than those fed on the proprietary foods. It seems more reasonable to suppose that something was done to the milk in 1913 that was not done in 1905. It is striking that boiling of the milk was very common in 1913. Unfortunately, the data as to the heating of the milk in 1905 are very incomplete, so that a comparison is impossible. The number of cases is, moreover, too small to justify any conclusion.

The disproportion between the number of cases fed on raw milk and heated milk and the great preponderance of cases fed on heated milk in 1913 suggested strongly that the heating of milk might play an important part in the etiology of scurvy. It also raised the question whether the large number of cases on heated milk in 1913 was simply a coincidence or whether there was some general factor of heating present in 1913 and not existent in 1905. It was thought that such a factor might be found in the more general pasteurization of the milk supply of Boston in recent years. There has been a rapid increase in the amount of pasteurized milk used in Boston during the last few years, as is shown by the following table:—

TABLE IV.

Year.	Percentage of Milk Pasteurized.	
1908	33.58	
1909	30.68	Approximate; probably too low.
1910	63.50	
1911	73.02	
1912	70.59	Approximate; probably too low.
1913	80.00	Estimated.

A comparison of the percentage of milk pasteurized in Boston and of the percentage of cases of scurvy to the total number of cases coming to the Medical Department of the Children's Hospital during the last ten years is instructive and suggestive.

TABLE V.

Year.	Percentage of Cases.	Percentage of Pasteurized Milk.
1904	0.11	
1905	0.43	
1906	0.17	
1907	0.33	
1908	0.24	33.58
1909	0.24	30.68
1910	0.47	63.50
1911	0.61	73.02
1912	0.67	70.59
1913	0.87	80.00

The figures given in this table do not, of course, prove positively that there really has been an increase in the number of cases of scurvy in the community during recent years or that, if there has been such an increase, it is due to the introduction and progressive increase of the commercial pasteurization of milk. Neither do they prove that the heating of milk, whether to the temperature of pasteurization or boiling, has anything to do with the etiology of scurvy. They do suggest, however, that there may be some such connection and justify further study of the subject on a larger scale.

Symptomatology. An analysis of the symptomatology of these cases was undertaken, but was not very satisfactory because of the meagerness of the records in many instances. The results of this analysis are given, however, for what they are worth.

The first symptom noted was:

Crying on handling	69
Paresis	11
Swelling of legs	5
Abnormality of gums	2
Ecchymoses	1
Bloody urine	2
"Failing"	1
Condition discovered at Hospital	2
Total	93

The following symptoms were noted at the examination, or were given in the history of the patient. They are undoubtedly incomplete, but presumably show something as to the relative frequency of the different symptoms.

Tenderness of the legs and crying on being handled	93
Swelling of legs (thighs 10, lower legs, 15)	25
Swelling of the arms	3
Loss of power in legs	20
Rigidity of legs	15
Inflammation of gums	37
Discoloration of urine or staining of diapers	6
Swelling of eyelids	1
Ecchymosis of eyelids	1
Ecchymoses	9

Errors in Diagnosis. The diagnosis of inflammation of the joints had been made in one of these cases, of fracture of the thigh in another, and of tuberculosis of the spine in still another. These figures do not give a correct impression, however, as to the frequency with which this disease is overlooked or mistaken for some other condition. This disease was recognized by the attending physician in but four of thirty-seven cases seen by the writer in consultation or at his office in the last five years. It was overlooked entirely in twelve, while the following diagnoses were made in the other cases:—

Rickets	1
Rheumatism	4
Injury to spine	1
Disease of spine	1
Diphtheritic paralysis	1
Infantile paralysis	3
Acute nephritis	5
Tuberculosis	1
Teething	1
Injury to leg	2
Inguinal hernia	1

It is evident, therefore, that in spite of all that has been written and said about infantile scorbutus during the past fifteen years, there are still many physicians who are not familiar with the disease or who, if they know of it, are unable to recognize it. A campaign of education is, therefore, necessary, especially in view of the fact that the disease is apparently on the increase.

VII.

Inguinal Hernia in Children.

By James S. Stone, M. D.

In the Children's Hospital since the establishment of the Surgical Service, 1019 cases of inguinal hernia have been operated upon.

This paper is based upon a study of these cases; the purpose being to present broad conclusions. Details of cases and details of treatment are given solely with the purpose of making the conclusions clear and of emphasizing points more commonly seen in children than in adults.

Etiology. It is today generally recognized that certainly in children the existence from birth of a patent sac is the common cause of hernia. The evidence of this congenital origin of inguinal hernia rests mainly upon the anatomical conditions which are practically invariably present. The structures of the cord, the vas and vessels, lie spread out upon the posterior surface of the sac and most intimately connected with it. In girls the anatomical conditions are practically always analogous to those found in boys. The round ligaments and the vessels lie spread out upon the posterior surface of the hernial sac.

The frequency with which a small hernial sac is found in association with a hydrocele of the cord is also evidence of the congenital origin of hernia. Instead of a sac patent from the peritoneal cavity to the tip there has been an obliteration of the sac at one or more spots. Very frequently indeed there is at one or more places in the sac a partial obliteration with the formation of a fibrous ring, often very adherent to the surrounding structures of the cord. Such conditions could not possibly be produced by the pushing out of a sac by any intra-abdominal force.

Confirmatory evidence of the congenital origin of hernia is found in other facts.

First. A very large majority of all cases occur on the right side. The left testis descends first and farther than the right. Thus there is a longer time and better opportunity for obliteration of the funicular process on the left. The patent sac is more common on the right.

Second. The sudden appearance of a hernia without adequate cause unless there existed a sac ready to receive the hernia. This condition is very common in both children and adults.

Third. The readiness with which a hernia at times develops the moment that for any reason fluid accumulates in the peritoneal cavity, while in other cases fluid can be present for months without the development of a hernia. In the one instance the fluid finds its way into and distends an existing sac. In the other instance the pressure of the fluid is not sufficient, although acting like a hydraulic press, to cause any yielding of the canal.

Fourth. The finding at autopsy or at operation for other conditions of a patent but empty sac.

If hernia is due to the existence from birth of a patent sac, the obvious question is why does the sac frequently remain empty so long. It may be so for months or years, even to adult life. In order to have anything enter the sac three conditions must exist simultaneously. First, there must be a relaxation of the muscles which naturally guard the entrance to the sac. Second, the other muscles of the abdomen must be tense in order to push anything into the sac. In the third place there must be something opposite the entrance to the sac able to pass into it.

It is most unusual to have some of the abdominal muscles tense and others relaxed. Hence the first two conditions seldom coexist. The third condition is more readily obtained, but is still important. A distended loop of bowel would not enter the sac readily. Neither would a flat portion of the omentum. A tab of omentum might easily enter. Fluid always enters readily. Much of the intestine has a mesentery

so short as to prevent it from entering a hernial sac.

Though almost all cases of hernia in children are due to the existence from birth of a patent sac it seems probable that other factors must be recognized, which apply both to children and adults. In infantile atrophy and frequently in old age there is an absorption of the fat which normally fills up the inter-spaces between the surrounding muscles and the tissues passing through the inguinal canal. There is at the same time an associated weakening of all the muscles, including those which guard the entrance to the inguinal canal. Any straining will under these conditions gradually push down a hernia. A hernia may occasionally be seen to develop in an atrophic baby, and the same thing may be seen in old age. The loss of the fat has given a point of vantage for the development of a hernia.

There remain some cases in which a hernia may develop gradually in strong individuals as a result of hard muscular work; the yielding of a weak point. There have been no cases seen in children in which this seems probable. It may explain the frequency with which men lifting and handling heavy and bulky objects have hernia.

In reviewing the histories of patients no special diseases seem to have any influence in causing hernia.

Diagnosis. In adults the existence of the tumor is the usual basis for the diagnosis. When not present the impulse on coughing, especially when the finger is inserted within the inguinal canal by invaginating the scrotum, is the common basis for diagnosis.

In children conditions are wholly different. Often the tumor makes the diagnosis perfectly obvious. Frequently, however, the mother has seen a tumor which at the time of examination is not present. In making the diagnosis of hernia one must first make sure that the testes have descended. If they are normal and the hernia is not down the diagnosis then must rest absolutely on the detection of the hernial sac. If it is present there is a potential hernia, and presumably the tumor noticed by the mother was a hernia.

In children little can be learned by invaginating the scrotum to get the finger into the canal. The testis frequently retracts above the finger. The canal is usually small unless the hernia has descended frequently and thus stretched it. The presence of the sac is to be determined by touch. On each side the structures of the cord are to be felt; the vas and the vessels. On each side they are ordinarily of approximately the same size. In cases of hernia the empty sac must be felt. The sac adds little to the size of the cord, but materially alters the feeling of the cord.

If the middle finger is held flat directly over the external ring parallel with Poupart's ligament, and the skin is then gently slid from side to side toward Poupart's ligament and away from it, the cord, including the vas and vessels, and the structures which enclose them, may readily be felt rolling under the finger. If there is no hernia the cords feel alike on each side. If there is a hernia on either side the sac is to be felt in addition to the cord. The feel of the sac rolling under the finger is to be compared to that of a small thin wet rubber finger cot. Something smooth and slippery rolls under the finger in addition to the vas and the vessels. The feel of the mass of veins of the cord is somewhat similar to that of the sac, but practice readily enables one to differentiate the two. One should feel in this way for the sac with the patient standing in case it cannot be felt while lying down. Standing frequently allows a little fluid to enter and distend the sac. In trying to feel the sac in this way the position of the finger held constantly flat against the abdominal wall is important.

Differential Diagnosis. In adults variocele and hydrocele are the tumors which must be differentiated from hernia. In children variocele is almost unknown. In one case the diagnosis of variocele was made. The mass was an adherent omental hernia. Variocele may follow a too tight operative closure of the canal. Hydrocele of the tunica vaginalis is not at all uncommon in infancy. It often exists at birth, frequently disappearing within a few months without special treatment. There is no reason for a mistake in diagnosis. As in adults the tumor is translucent. It is painless unless due to injury or infection or unless the tension is extreme. But the essential diagnostic feature is the absence of any direct connection other than the normal cord between the swelling in the scrotum and the peritoneal cavity. Encysted hydrocele of the cord is, however, very common indeed in children. It is in differentiating hydrocele of the cord from hernia that the greatest difficulty arises. While the difference is often of relatively slight practical importance, yet mistakes made are often very annoying.

Hydrocele of the cord may be unilocular or multilocular. It is usually associated with a hernial sac, frequently very small. The more carefully the cases are observed, both clinically and at operation, the more often does one find that the hydroceles are multilocular and that there exists also a hernial sac.

The most reliable means of distinguishing hydrocele of the cord is the ability to grasp it and move it up and down and from side to side without the restraint which would be inevitable were there anything beside the cord and vessels which connected the mass with the abdominal cavity.

A hydrocele of the cord which has retracted within the canal cannot be differentiated from a hernia unless it is drawn downward suffici-

ently to get a finger above it and find no abnormal contents of the canal.

There have been a few instances of suppurating hydroceles of the cord. The tumor in such cases resembles closely an abscess originating in a lymph node. On the other hand the location of the tumor is distinctly along the inguinal canal rather than just outside it along the course of the lymph nodes. The history of such a tumor is different from that of a bubo. The mass may have been noticed along or outside the inguinal canal for some time, giving no particular trouble until inflamed.

The differentiation between such a mass and a gangrenous strangulated hernia must be made on general grounds. The absence of the intestinal obstruction and of the profound shock which accompany such a hernia are sufficient.

On the other, hand, in these cases there is a distinct danger from the suppurating hydroceles of the cord. Very often the partition between the hydrocele and a hernial sac above it or between the hydrocele and the peritoneal cavity is an extremely thin membrance. The risk under such circumstances from rupture internally and peritonitis is obvious.

It would seem at first sight as though hydrocele of the cord which was suppurating would heal completely if drained and packed. Obviously no other treatment is wise at the time. On the other hand, the hydroceles are often multilocular and often associated with hernial sacs. It is therefore wise as soon as the inflammation has subsided to examine carefully to determine the presence or absence of other hydrocele sacs or of a hernial sac. Then the choice may be made of a radical operation or of waiting for symptoms to arise.

Undescended Testis. In children, especially in those under eight or ten years of age, it is necessary to define exactly what is meant by undescended testis. The extreme mobility of the testes in infancy and early childhood must be recognized.

In a great many instances children are brought for an operation because the mothers, never the fathers, think they are not quite properly developed. In many the testes are of normal size and may be either just within or just outside the external ring. The scrotum is empty. If search for the testis is made from below upward it recedes out of reach within the inguinal canal. In such cases, and whenever there is any doubt, the examiner must always begin by making firm pressure at a point over the inguinal canal just above the external ring. In this manner the testis if in the canal is felt, and if outside the canal is held there by the pressure of the finger so that it may be grasped from below with the other hand. If the testis is felt in the canal it may frequently be pushed downward with the finger and then grasped from below. No testicle which can be drawn or pushed down into the scrotum is to be regarded as undescended. No such testis requires treatment unless under most exceptional circumstances.

Occasionally if extremely retracted the testis may become more or less pinched. Thus there may be sufficient irritation to cause continued spasm of the cremaster muscle and long continued retention of the testis high up toward if not within the inguinal canal. Considerable pain in the inguinal region may result. The testis thus held tight within the canal may become slightly tender. Rest in bed for a few days relieves such a condition. A testis thus strongly retracted may be drawn within the abdomen. In the same manner a normal testis may be pushed back into the abdomen in childhood. In one instance a normal testis so pushed back by the patient never descended again.

Treatment. It has become the rule of the hospital to advise operation in practically every case. Palliative treatment holds back a hernia. It does not effect a cure.

The obliteration or the excision of the hernial sac is the essential factor in a cure. On this fact are based the dangerous and uncertain methods of treatment by the injection of chemical irritants.

In many instances after prolonged use of a truss the hernia does not again appear. But the longer these patients are followed and the more carefully they are studied the fewer become the cases in which one finds that the hernial sac has become obliterated. While the sac remains patent there is always a potential hernia. The risk of such a potential hernia depends upon the proximity to skilled surgical aid in case of need.

As the children are brought to the hospital the practical question which arises is whether there is any contra-indication to operation. If any exists some form of truss is advised. If there is no contra-indication operation is advised. Largely on account of the lack of beds for infants operation is usually performed after the child is two years old. But entirely independent of that consideration unless special reason arises operation is not usually advised until after the babies are weaned and have a good start in life. The risks from operation, slight as they are, seem less in the older children.

Palliative Treatment. In patients waiting for operation or in whom operation is inadvisable the worsted truss is ordinarily advised unless the child is over three years old.

The advantages of the worsted truss are that while almost always efficient it cannot exert injurious pressure. It can be washed. The baby can be put in the bath with the truss on. When the baby is dry and quiet the wet truss may be replaced by a dry one and the one removed may be cleaned and dried for use again.

The method of application is of considerable importance. The skein of yarn is so placed that one end of the loop comes directly over the ex-

ternal ring. The other end is then carried outward around the affected side, brought behind the back above the buttocks and then forward across the abdomen to be passed through the loop placed over the external ring. The free end is then carried under the tuberosity of the ischium of the affected side and brought upward to be tied at a point over the sacro-iliac joint to the skein as it crosses the back. The location at which this tie is made is important. If too far out flexion of the thigh loosens the truss. If too near the median line the worsted slips between the buttocks, irritates the parts and becomes dirty. At the sides the worsted passes above the great trochanter and below the crest of the ilium.

Usually one skein of the white Germantown yarn is used. Less is seldom sufficient. More may be needed in a hernia hard to hold back. A skein may be applied to each side in cases of double hernia.

Operative Technique. The incision, seldom over an inch and a half long and often less, is made parallel with Poupart's ligament, and with the center directly over the upper angle of the external ring. The position of the external ring should always be located by touch just before the cut is made.

The first possibility for error lies in confusing the deep fascia and the aponeurosis of the external oblique muscle. They are always separated by a distinct layer of fat. The fascia, owing to the fat beneath it, is much more readily lifted up with forceps than is the aponeurosis, which is intimately connected with the underlying muscles. After the surface of the external oblique is cleared there is no difficulty in recognizing the external ring—if in no other way, by the intercolumnar fibres running across the upper outer end.

If, however, the incision is a little too near the median line, the hole in the aponeurosis through which the ilio-hypogastric nerve passes is exposed, and if large may be mistaken by an inexperienced operator for the external ring. Thus misled, the search for the sac may be carried down near the lower end of the semilunar line. In one patient whose hernia had not been cured at first, a second operation showed the inguinal canal untouched, while the scar was found in the region mentioned.

The anterior surface of the aponeurosis should be neatly cleaned of fat and cellular tissue. Then the canal is exposed thoroughly by slitting the aponeurosis of the external oblique upward and outward in the line of the fibres as far as the place where the edge of the internal oblique and transversalis muscles spring away from Poupart's ligaments. Care is necessary to avoid cutting the ilio-inguinal nerve, which usually lies directly beneath the line of the incision in front of the cord and its coverings. The nerve is not to be confused with the vas, which practically invariably lies among the vessels on the posterior surface of the sac.

Before more is done the under surface of the split aponeurosis is separated on the inner side from the underlying internal oblique muscle and on the outer side from the cremaster muscle and cellular tissue down to Poupart's ligament. The cremaster muscle lies exposed in the bottom of the wound. It should be seized with two pairs of forceps at the lower central part of the canal and drawn downward and inward. The fibres are thus put upon the stretch, and may readily be split down to the sac or the fibrous tissue surrounding it. Thus the most readily isolated upper middle part of the sac is exposed first.

In dissecting the sac free from the surrounding tissues one should invariably get down to the peritoneum before attempting to separate the surrounding tissues. When the peritoneal layer is reached it has a definite blueish color. If fibrous tissue still remains the color is more white. If the peritoneal layer of the sac is reached the other structures of the cord are readily separated. If dissection with gauze is used great care is necessary not to put any tension on the delicate vas deferens. It may be torn if stretched by careless dissection.

If the dissection is kept close to the peritoneum no blood vessels need be injured. The vas should not be touched directly. Extreme care is necessary to avoid any handling of either testis or epididymis. Ecchymosis or oedema of the scrotum does not occur in cases in which care is taken to keep absolutely to the peritoneal layer in dissecting free the sac.

Swelling of the testis or epididymis does not occur unless these structures or the vas have been roughly handled, or unless gauze or something rough has come in contact with the serous surface of the testis.

The chief hindrance to easy dissection of the sac lies in the frequent occurrence of fibrous rings adherent to the surrounding tissues; places at which there has been a partial closure of the funicular process. The sac is to be freed until it becomes somewhat fibrous in the region of the internal ring, which usually is an imaginary structure, and until the extra peritoneal fat is reached. The empty sac, drawn strongly out, is perforated at the neck, tied in each direction and cut away. The stitch, still attached to the stump of the sac, is then drawn out into view. With this as a guide the needle on the stitch follows the stump of the sac as it is allowed to recede behind the internal oblique and transversalis muscles. The needle is then brought out through these muscles and through the aponeurosis of the external oblique at a point slightly above and to the inner side of the upper end of the slit in the last structure. Thus the puckered peritoneum at the neck of the sac is drawn up behind solid muscle, while smooth peritoneum is stretched across

the region of the canal. The stitch is temporarily laid aside.

Usually three interrupted stitches are then placed to unite the borders of the internal oblique and transversalis muscles to Poupart's ligament. They are all placed in front of the cord. Thus the length and breadth of the canal are decidedly decreased. The angle between Poupart's ligament and the edge of the muscles at the inner side of the canal is frequently wide, especially in a hernia of long standing. This angle is of course at once closed by the operation.

For many years the cord has not been transplanted unless for some special reason. In the Bassini operation, with transfer of the cord and vessels, relapse was rare, but when it did occur it was always at the upper angle of the old inguinal canal, the point at which the cord and vessels were brought forward through the deeper part of the abdominal wall. Those who still transfer the cord usually guard against relapse by passing one stitch above the cord and vessels. They do not carry the lesson taught by relapses to its logical conclusion.

Operative Complications. Certain complications have arisen during operation. In girls with ovaries which have descended into the canal the ovarian vessels must first be separated from the sac, as in an ordinary hernia, and then after excision of the sac the ovary and its vessels must be either sufficiently freed to permit their replacement en masse within the abdomen, or in case the vessels are too intricately connected with the walls of the canal they must be rolled back into the abdomen.

There have been a very few cases in which mesenteric vessels required similar treatment. In one instance a portion of the bladder pushed into the canal. In treating these conditions the object sought has always been a complete removal of the peritoneal sac and a replacement of the other structures uninjured within the abdomen.

One exception has been made to this rule, in a case already repeated in the *Annals of Surgery*. A patient with absolutely normal female external genitalia had an inguinal hernia first on one side and then on the other. On each side a normal testicle was found and removed.

Many cases have been complicated by incomplete descent of the testes. No children have been operated upon in whom the testis had not at least entered the inguinal canal. In general, with incomplete descent of the testis operation has been postponed till well toward puberty, provided the hernia was not giving trouble and provided the position of the testis did not subject it to injury. The object sought by operation has been the separation of enough of the sac to form a tunica vaginalis, the closure of the peritoneum at the neck of the sac, the displacement of the testis downward into the scrotum as far as possible. In securing freedom of the testis it has not been found that the vessels alone were short. Usually all the structures of the cord, including vas and vessels, were deficient.

It is essential for the proper development of the testis that the vascular supply should not be materially injured. The testis should not be roughly handled—if possible it should always be kept covered by peritoneum. Touching the uncovered testis with dry gauze commonly causes much more inflammatory reaction than much squeezing and traction on the protected testis. Retention of the testis in its new position has usually been secured by suture of the tissues about the vas, as it emerges from the abdomen, to Poupart's ligament.

After Care. Various methods of dressing the wound are used according to circumstances. Usually a cocoon made up of a few layers of sterile gauze, is fastened over the wound with flexible collodion. This practically protects the wound from being wet with urine, while at the same time the small amount of gauze is enough to absorb the few drops of blood which may come from the incision. Ordinarily a gauze pad and a spica bandage are applied outside of the collodion dressing. In older children no special precautions are needed to prevent wetting of this dressing. In the younger children various methods to prevent this are used. A thin rubber finger cot may be fastened about the penis with adhesive plaster. The closed end of the cot is slit and fastened to a rubber tube, which conducts away the urine. Of course the cot must be changed before the skin becomes irritated by any urine retained within it.

In some instances the penis may be placed directly in a wide necked bottle tied in place. A piece of thin rubber dam with a small hole cut in it may be placed around the penis. In infants by far the simplest method is that of Stiles—no special dressing. The baby is held on its back by loosely fastening the arms and legs to the sides of the bed. Thus the child is kept from scratching the wound. When a boy passes urine when lying on his back the stream practically always shoots upward and toward the foot of the bed. Any absorbent material stretched below the baby's feet catches the urine. and may be changed as is necessary. The bed clothes must be held up by means of some form of bed cradle.

In girls the dressing may be modified by substituting a pad of absorbent cotton placed between the thighs for the absorbent sheet placed below the feet for boys. In most cases treated in this way a small cocoon is first placed directly over the wound.

In the earlier cases the children were kept in bed for about eighteen days and were discharged at the end of three weeks after operation. Gradually this length of time has been

cut down. At the present time the children are usually kept in bed about ten to twelve days, and are discharged at the end of a fortnight. A spica bandage is usually continued for a fortnight or so after the child is discharged. Some restraint of violent exercise is generally advised for a couple of months after operation.

VIII.

A Case of Chondro-osteo-sarcoma. Amputation at the Hip.

By Robert W. Lovett, M.D.

[From the Orthopedic Clinic of the Children's Hospital.]

C. P., a boy 11½ years old, was admitted to the hospital on February 24, 1913. The family history was good, and the personal history showed measles, pertussis and diphtheria seven and six years previously. There had been no known exposure to tuberculosis. In the fall of 1911, that is, about eighteen months prior to admission, while playing football his right leg had been hurt near the hip. Off and on since then he had limped. He had never had any acute pain, he had eaten and slept well, and there had been no loss of weight. The parents had noticed that the upper part of the right thigh was larger than the left.

Chondro-osteo-sarcoma of Femur.

Physical examination showed that the boy was well developed and nourished, the pupils were equal and reacted to light and distance, the throat was normal, the heart and lungs were normal, the abdomen was soft with no masses or tenderness, the inguinal glands on the right side were enlarged, and a few glands felt in the left inguinal region. Just below and anterior to the right trochanter there was a swelling about three inches in diameter, not reddened but hard and apparently connected with the bone. There was some slight tenderness on pressure over the middle of the tumor. The legs were of equal length, and there was no difference in the circumference of the calves. The thigh was 1¾ inches more in circumference over the tumorous mass than at a corresponding point on the other thigh. There was no distinct limitation of motion of either hip, although the movements in the right hip were perhaps a little less free than those in the other. Examination of the urine showed that it was acid, with little sediment, no albumin, sugar or acetone. Microscopic examination showed no casts, blood, white blood corpuscles, but a few mucous shreds. The von Pirquet skin test was positive, the leucocyte count was 6,500, the Wassermann reaction was negative. The x-ray showed a thickening of the upper

Chondro-osteo-sarcoma.

four inches of the shaft of the femur, and a rounded curve from the neck to the shaft on the outside replaced the normal angle of the trochanter. In the interior of the bone the normal structure was replaced by a somewhat globular homogeneous area both in the cortex and in the medulla. It appeared to be fairly sharply limited, and the suggestion was of a more or less encysted tumor about 2½ inches in length from above downward.

The diagnosis was a troublesome one, and we considered a malignant growth, bone cyst and syphi-

lis. Tuberculosis was suggested by the positive von Pirquet test, but the character of the lesion was not in any way characteristic, and it was regarded as unlikely. The expansion of bone present in this case was not characteristic of bone cysts, and had not existed in those of the same region that I had seen. I therefore regarded that as unlikely. The lesion was also not characteristic of syphilis. The Wassermann test was negative, and the family history negative. Although I felt that no one of these possibilities could be excluded, theoretically I was inclined to the diagnosis of a malignant tumor involving the upper part of the femur. The boy was kept in the ward for study until March 7, when it seemed wise to remove a sufficient amount of the growth for examination in order that the diagnosis might be perfectly sure, because if a malignant tumor existed amputation at the hip joint seemed the only means of cure.

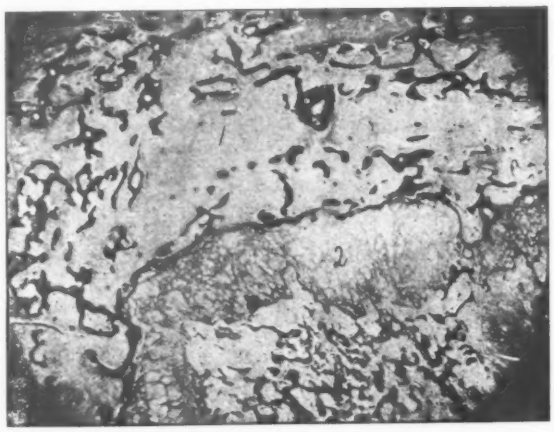
On March 7 I made an incision over the tumor growth, and with a bone gouge removed a piece of bone ¾ inch long and ½ inch thick. Periosteum was sewed over the bone removed, and the operative material sent to Dr. Councilman for examination. Dr. Councilman reported on the 10th of March as follows:

> "The tumor contains some cartilage and small areas of imperfectly formed bone. The general mass is composed of spindle cells. Nuclear figures indicative of rapid growth are few. The cells are few and compactly welded. The tumor seems to originate from periosteum. It is undoubtedly malignant, but whether it has reached the stage of generalization cannot be said."

The boy made a perfectly good recovery from the operation of March 7, and the parents were advised that amputation at the hip joint seemed to be the only treatment worth pursuing. They accepted the situation, and on March 13, 1913, the boy was etherized by Dr. Freeman Allen, who was good enough to serve on account of the character of the operation. Dr. James S. Stone was also good enough to assist me in the amputation. The Wyeth skewers were passed to hold the tourniquet, and there was very little bleeding during the operation. The only difficulty was that on account of the possible involvement of the skin on the outer surface of the femur where I had made the exploratory operation, I was anxious to remove all that material, and, to do this it was necessary to do most of the work at the inside of the femur, leaving the outer surface as far as possible intact and using the inner flap, consequently the dissection was carried on on the inside of the femur and the head disarticulated from the inside, thus removing the tissue positively infected with the tumor.

The patient suffered little or no shock, and had little temperature reaction. The father was told that the specimen carefully examined might be of use, and requested that it should be done. It was therefore sent to Dr. Councilman for examination, who reported on March 17, 1913, as follows:

> "I enclose you a photograph of the cross section of the upper third of the femur which you sent. As you see, the bone is greatly enlarged, and the interior of the bone is filled with a tumor mass that extends up toward the head of the bone at the line just beneath the epiphysis, which I have marked out in ink. Beyond that line the bone seems to be normal. I have also examined a section of the bone taken from the lower part of the medulla (at a point about six inches below the trochanter). I did not go lower down. The whole bone between the two ink lines on the photograph is to a greater or less extent infiltrated by the tumor. On the outer aspect of the thigh the entire bone is involved out to the edge of the periosteum, which you see is somewhat elevated. The pale, homogeneous masses in the centre are chiefly composed of cartilage in which there is some hemorrhage. I do not see what you could have done save amputate as you did. I think that the tumor started in the medulla of the bone in the cartilage, that it is essentially a chrondo-osteosarcoma, and it did not start from the periosteum, which is elevated and involved secondarily. There would have been, as you see, no question of shelling out the tumor or doing anything more than you did. I do not think that there is any probability of there being now or at any time in the future a metastasis from this tumor."

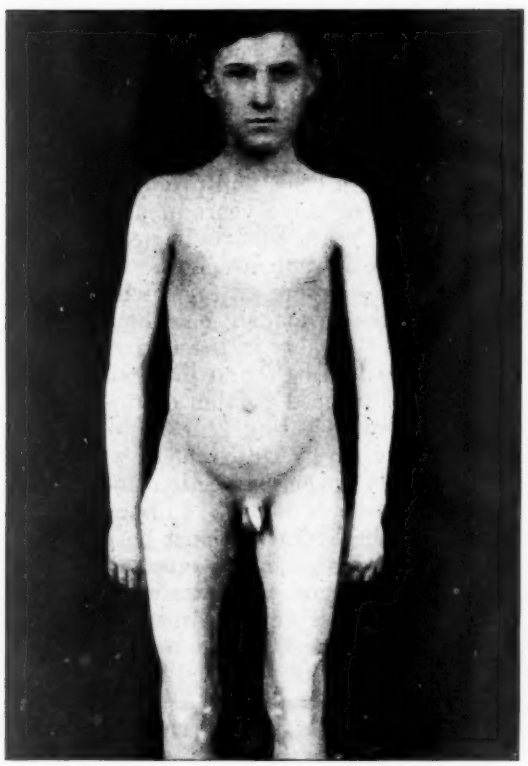


Chondro-osteo-sarcoma.

On April 9, 1913, Dr. Councilman wrote me again with regard to the case as follows:

> "I have been a good deal interested in the tumor of the leg, and I send you some further studies upon it. Figure 1 shows the myxomatous part of the tumor. As you will see, the cells are typically stellate, inter-communicating, and lie in a homogeneous stroma. It is an unusually fine specimen of the myxoma. The large specimen, No. 2, comes from the sharp limit of the tumor which is marked on the colored photograph of the thigh which I enclose. As you will see, the line of junction between the tumor and the cancerous tissue of the bone is perfectly sharp. The tumor is marked on the photograph 1, the normal bone 2. It is very interesting to see that the tumor here is not as sharp as it seems to be. You will notice a little island in the midst of the marrow, which is marked 3. This denotes an extension of the tumor, showing as a small island in the marrow.

You will also note on the edge of the tumor the gradual replacement of the marrow tissue. The tumor, as I conceive it, started mainly as an enchondroma, but with elements of the connective tissues superadded. This was probably congenital. As it began to grow, elements other than the cartilage gained the upper hand, and it became essentially myxoma fibroma. In the growth of this tissue both bone and cartilage disappeared. The large photograph (3) is a very low power through a portion of the cartilage and the bone. The very black masses in the upper portion of the specimen marked 1 show the remains of the bone



Chondro-osteo-sarcoma. Right Femur.

which is being absorbed, with the tumor tissue in between. The lower portion of the specimen marked 2 shows the cartilage undergoing the same sort of absorption. The specimen marked 4 is from the shaft of the bone, and it shows the growing tumor, and the bone absorption. The pale areas here represent the bone, and about these you find growing tissue of the tumor, and along the edges of the bone the absorbing giant cells or osteoclasts. The specimen 5 shows the same thing happening at the edge of the cartilage. The homogeneous areas in this represent the cartilage, which is at this point almost entirely replaced by the growing tissue. I think that your operation was a timely one, and there should be no return of metastasis from tumor, although the single point which I have called your attention to in the marrow renders this just a little doubtful."

The boy remained in the hospital until April 10, 1913, making perfectly good progress. There had been a certain amount of fat necrosis in the flap, but union occurred perfectly well, and when he was discharged there was a slight area about the size of the thumb nail which was granulating. His general condition was excellent, and he was discharged home.

IX.

OBSTETRICAL PARALYSIS WITH ESPECIAL REFERENCE TO TREATMENT.

BY JOHN JENKS THOMAS, A.M., M.D.

A LITTLE over eight years ago there was published in the BOSTON MEDICAL AND SURGICAL JOURNAL an article written by me in which I reported two cases of bilateral paralysis of the lower-arm type resulting from injuries at birth. It is not my intention to say anything further at this time in regard to this rather rare form of obstetrical paralysis in the child, of which in twenty years' work at the Children's Hospital I have not seen more than a dozen cases, but I wish simply to allude to the conclusion then stated in regard to the etiology of these birth injuries of the child. As I then stated, the weight of opinion of the more recent writers, Fieux, Duval and Guillain, Schoemaker, Stolper, and Walton, and Stone here in Boston, was inclined to the view that the injury is due to stretching of the plexus in head presentations from the shoulder at the pubes being held back. Confirmation of this theory is also obtained by what has been found at operation in these cases, as in the cases reported in the excellent article of Clark, Prout and Taylor, published after my former paper was written. Dr. Stone, who has kindly operated on some of my cases, once found the plexus entirely lost in a mass of scar tissue lying at Erb's point, so that the nerve resection which we had planned had to be given up as the gap was too great to be bridged.

We may assume then that the paralyses of one arm occurring in infants during delivery are due to injuries of the plexus from stretching. In severe cases hemorrhage takes place about the plexus, or the plexus may at times be ruptured, while in milder cases there is a hemorrhage within the connective tissue sheath of the cord of the plexus with the resulting fusiform fibrous swellings described by Clark, Prout and Taylor, while probably in the mildest cases we have merely a stretching of the nerve bundle with consequent exudation within the sheath. A case illustrating this was one sent to me about nine years ago by Dr. Hunting of Quincy, where a boy of fourteen at a summer camp for boys was punished for some infraction of the rules by being made to carry a number of buckets of wet sand, which he did by placing the bucket on his shoulder, thus press-

ing the shoulder down and the head to one side, and producing a paralysis of the obstetrical type. That the severity of the injury varies in some such way as I have suggested is indicated by the varying severity and duration of the symptoms. No doubt many of the cases where the arm hangs limp by the side recover within a period of time in the neighborhood of a couple of months. If this were not so we should hardly have such varying ideas as to the seriousness of such birth injuries as we find among physicians. As a rule, I think general practitioners and obstetricians regard these cases as quickly curable. The neurologist and orthopedic surgeon to whom the severer cases come later for treatment, on the other hand, probably regard them too seriously, as extremely obstinate paralyses for which little can be done. The pediatrician probably occupies a position about midway between these two extremes.

The grouping of the muscles affected in this form of paralysis is well known as they are the muscles represented in the plexus at Erb's point, where the fifth and sixth cervical nerve roots unite to form the upper cord of the plexus, just before the supra-scapular nerve is given off. These comprise the deltoid, supra- and infra-spinatus, brachialis anticus, biceps, supinator longus, and probably the supinator brevis also. The resulting paralysis leaves an arm which cannot be abducted, and hangs by the side with the elbow extended and with marked pronation and internal rotation of both the upper arm and the forearm. As time passes, even with untreated cases, a partial recovery is seen. The flexion of the forearm at the elbow is practically always regained, and also abduction of the arm from the trunk, but in even moderate cases supination of the forearm always remains poor, and the external rotation of the humerus improves least of all, which accounts for the elevation of the elbow in attempting to bring the hand to the mouth, a fact that can be easily verified by anyone by attempting to put the thumb in the mouth while the humerus is strongly rotated inward. In the older cases with this trouble we find a lack of development of both muscles and bones of the affected extremity, and indeed of the whole shoulder girdle, which is evidently secondary to the paralysis and lack of use. One fact, however, is most striking in all cases that have persisted over some three years or more, and that is the notable lack of flaccidity, hypotonia and atrophy in the affected muscles. This is very striking if one compares one of these cases with weakness of the deltoid and spinati with a case where the same muscles have been left paralysed from an attack of poliomyelitis. In the latter the flaccid, atrophied condition of the deltoid allows one to see very clearly even at a distance the bony prominences about the shoulder, and the head of the humerus, while often there is a distinct space between the head of the humerus and the acromion due to the dropping of the whole arm, while in cases of obstetrical paralysis even though the muscles are much smaller than those of the unaffected shoulder there is almost never the extreme atrophy with prominence of the bony structures so striking in the cases of poliomyelitis.

The treatment of these cases may be divided into the operative and the non-operative. Of the first I shall speak very briefly. Two procedures in general have proved useful. The operations on joints to relieve limitation of motion from ligamentous contracture, and the transplantation of strong muscles to supplement the action of weak ones, the best results being from transplanting the pectoral, or the trapezius into the deltoid; and the excision of a portion of the brachial plexus at Erb's point, and the suture of the nerve trunks, as first practised, so far as I have been able to learn, by Kennedy of Glasgow, and later by Taylor of New York. Briefly this method should not be used too early, certainly not under a year, and probably not under two and a half or three years of age, and after seven or eight years of age it probably offers very little hope of improvement. It should be reserved for the severe cases which show little tendency to improvement, or which have not been treated. Probably in a good many of these severer cases it will be found impossible to trace and excise the injured portion of the plexus because of the surrounding scar tissue as in the case operated upon by Dr. Stone of which I have spoken. In cases where resection and suture of the plexus has been done it is important to remember that the operation must be followed by exercises and training of the muscles.

The second method of treatment of which I wish to speak which we have used at the Neurological Clinic at the Children's Hospital for a number of years, may be called that by massage and educational gymnastics. This method is based upon the belief that in most cases the affected muscles in time recover some slight power over which there is voluntary control, and that the awkward movements are due to the child using the stronger muscles, and accomplishing its object by using the arm in a different way from the natural movement. That this is so I think is proved by the very moderate atrophy of the affected muscles, and the very evident contraction that can be felt in them when the child attempts to use them. Thus abduction of the arm returns in part, some of the motion being due to movement of the scapula, but also from action of the deltoid, which serves at least to fix the humerus on the scapula. With some returning power in the affected muscles the arm is still used awkwardly, because the child learns to substitute the action of stronger muscles for those of weak ones, in order to execute the desired movement. For example when the forearm is flexed in order to bring the hand to the mouth, in case there is internal rotation of the humerus, the elbow must be abducted to compensate for this internal rotation. By a system of ingeniously devised plays the very small infant can be

taught to execute desired movements in a surprising way. To be successful this method of treatment should be started when the child is very young, preferably under one month, and must be persisted in for a number of years, with gradually lengthened vacations from treatment, till the child uses the arm naturally from habit. To these educational gymnastics we add passive movements, and also massage, to prevent the formation of deformities, and to aid in the growth of the limb.

We may divide the treatment into three parts:

1. Passive movements of the joints, shoulder, elbow, wrist and fingers, best done by someone who knows the anatomical possibilities and limitations of these joint movements. These movements need to be continued until the arm has entirely recovered.

2. Massage, of the gentle kneading form, to stimulate growth, which may be discontinued when the arm keeps up in growth with the unaffected one.

3. Exercises, to induce the child to use the arm, voluntarily, which vary with the age of the child.

(a) Under the age of two months one uses gentle irregular movements, carried out by the operator, and by the mother between treatments, such as moving the baby's hand and arm in various directions in imitation of voluntary movements made by the other arm.

(b) After two months when the baby begins to notice its hands and fingers more definite exercises are employed such as bending, stretching, or spreading the baby's fingers while the operator moves her own in a similar way. Very soon, especially if these movements are accompanied by some nursery rhyme the child will begin to imitate the movement and perform it without assistance. Besides the finger movements various others are used. The hand is flexed and extended at the wrist, and then carried to the neck thus flexing the forearm; the forearm is abducted and adducted with the hand supinated and the elbow bent and held at the side; arm extension in supination, where with the elbow bent and at the side the forearm is rotated outward, but within the limits of comfort, the hand in supination, the arm is extended by the operator in the direction of the line of the forearm. The next exercise consists in the operator lifting the arm to as near a vertical position as possible, from a position of extension in supination; then from the vertical position the elbow is lowered to the side bringing the hand to the shoulder or neck. From the position with the elbow bent and at the side the arm is stretched out and returned; and the arm in the horizontally stretched-out position is swung to describe a cone. These exercises are repeated a definite number of times, from two to eight each. Then come the exercises for the two arms together. The arms are stretched sideways three or four times and then the hands carried to the head; the arms are extended upward, and then returned to the bent position; the arms form a circle in front of the body the fingers touching and then the arms are carried upward until the hands are over the head and then separated and lowered to the sides. There are numerous variations of these exercises which are used while the child needs assistance in performing them, that is till ten or twelve months of age.

(c) At this age the child begins to rebel at interference and shows plainly a desire to act independently. From that time till about two years of age it is greatly absorbed in blocks, and it can be induced to reach in all of the directions given in the previous exercises in order to get the block which it wishes for building purposes provided it cannot get it otherwise. It can also be tempted to put blocks into a box held at various points calling for the muscular action desired. A box of blocks kept especially for the lesson is found to work well in keeping the interest of the child.

(d) At about eighteen months of age the child can be induced to return to the first exercises with the rhymes, but now done voluntarily, and dumb-bells, wands, balls, bean-bags and such things can be utilized, the same movements being carried out with these objects. At two and a half or three years the child will swing on a bar, walk into the corner with arms spread out, creep up the wall with the fingers and other exercises devised to use the desired movements. The last muscles to develop are usually the outward rotators of the humerus, and the supinators. These often need attention after the arm is apparently well. The special exercise for this stage is, with the elbow bent at the side, and the forearm in supination and abducted, with a small iron dumb-bell in the hand, the arm is extended in the direction of the line of the forearm.

We have obtained such excellent results at the Children's Hospital from such a system of what I have called educational gymnastics that we have entirely given up the use of electricity in cases of obstetrical paralysis, partly because it is much less effective, and partly because the muscles which need exercises and electrical stimulation the most, namely the spinati, practically cannot be stimulated by electricity because of the overlying fibres of the latissimus and trapezius.

As illustrations of some of our results with this treatment I wish to cite three cases:

CASE 1. Grace G. was first seen when three months of age. The labor had been hard and forceps were used. It was noticed very soon after birth that the left arm was not moved, but she always moved the fingers and hand, though the thumb was held in the palm most of the time. She was first seen in April, 1907. In July she could lift the arm

to the level of the mouth, but only flexed the elbow slightly, and there was still considerable pronation of the humerus and marked pronation of the forearm. In November she could flex more at the elbow, but supinated very little. By March, 1908, she could supinate about twenty degrees beyond the mid point, put the hand behind the head, and elevate fully. In September of that year she could elevate the arm to the perpendicular, put the hand behind the head, and the hand to the mouth without elevating the elbow, and supination, while the most affected movement, was two-thirds normal. In January, 1909, I have noted that supination seems to be to the full extent if the humerus is held in external rotation, and the whole trouble seems to consist in a partial loss of this external rotation. In December, 1912, when the arm was hanging by the side there was a little internal rotation of the humerus, but actively it could be rotated outward as well as the unaffected one, and all movements were normal, though at times the elbow was elevated. The left arm was half a centimeter shorter than the right, and the forearm six-tenths smaller while the circumference of the upper arms was the same.

CASE 2. Ellen P. was first seen on July 21, 1909, at the age of two weeks. The delivery had been by the breech, with no especial difficulty in the delivery of either the head or body. Immediately after birth it was noted that neither arm was moved, and that the right one was pronated but the left was not. When first seen the child had begun to move the left arm freely, but not the right one. This arm was held at the side and could not be abducted nor flexed, and was strongly pronated, while the movements of the wrist and fingers were freely made. By November the arm could be abducted to the level of the shoulder, flexion of the forearm was good, and there was some power of supination. In April, 1910, flexion of the forearm was normal, she could raise the hand to the level of the top of the head, supination was fair, and there was some external rotation possible of the humerus, though the pectoral was more tense than normal. In July, 1910, she could elevate the arm fully, and supinate the forearm completely, and the only distinct sign of the paralysis was a moderate internal rotation of the humerus, and that the child occasionally raised the elbow in putting the hand up. At the present time there is no difference in the length or circumference of the two arms, and all movements are normal.

CASE 3. Mary L. was seen first on October 11, 1905, at the age of eight weeks. There had been great difficulty in the delivery of the shoulders, and since birth the left arm had been motionless at the side except for some movements of the fingers. It could not be flexed at the elbow, was strongly rotated inward, and pronated, and there was no power of abduction. This case is mentioned because it was treated by the exercises alone, with no massage, and by April, 1909, she could make all movements well with the affected arm, and could supinate quite well, but there was considerable hanging behind in growth of the arm, though I have unfortunately been unable to find the measurements, but the difference was much more than in the cases which also received massage during the treatment, thus showing the importance of this in preventing the lagging behind in growth.

X.

ROUND SHOULDERS WITH SHORT CLAVICLES.

BY AUGUSTUS THORNDIKE, M.D.

The following is published because of peculiar features:—

Annie M., aged nine years, first came to the Children's Hospital in January, 1912. Her mother had noticed stooping shoulders since the age of four years, a condition which steadily grew worse. She had always been thin and puny. There was no lateral curvature, but the shoulders were very sloping and drooped far forward, producing a hollow chested appearance. The tips of the shoulders seemed very close to the nipples, and by measurement were less than two inches from them, while the scapulae projected like angel wings.

She began treatment at the hospital with two months of exercises. She had previously had them at home under direction of her physician without benefit. Entirely at the parents' request she entered the hospital wards to see if an operation could be done. The position of her shoulders and her general attitude is shown in the photographs. The muscles of the upper back were very little developed, while the great pectoral muscles were so stout and short that they effectually prevented throwing the shoulders back. The collar bone seemed short and the upper part of the body of the shoulderblade could be felt curving forward at a right angle to the plane of the lower portion.

Were the clavicles really short or did they seem so? I was unable to find any data relating to variations in the size of clavicles during the period of growth. We know that the size and shape are affected by rickets, osteomalacia, and that shortening occurs from fractures; in rare instances the bone or a large part of it may be absent at birth. No other assistance was obtained from the literature.

Certain definite proportions exist between the total height of the human body and that of parts, like the head, trunk, arms, legs. Painters and sculptors make use of these proportions. Why not extend this rule to other bones in the body? Why not apply it as a test to children's clavicles, and find out what relative proportion exists between the length of the clavicle and the height of the child? I accordingly measured these on three different occasions in the hospital wards. Twenty children were measured at one time, thirteen at another and six at another time, a total of thirty-nine children between the ages of two and twelve years. The ratio between the length of the clavicle and the height of the child averaged 9.97%. That is to say, the average of thirty-nine children showed the length of the clavicle to be 10% of the child's height. Individual measurements varied, the shortest was 8.8%, the longest 11.2%.

Annie M's. clavicles measured 4⅛ inches, her height 52 inches, the ratio 7.9%. In other

words, her collar bones were relatively 1% shorter than the shortest, and in order to attain average proportions, each bone should be an inch longer.

Annie M. Round sloping shoulders, short collar bones.

This was explained to the parents, and at their request on March 18th, under ether, the clavicles were divided by an oblique osteotomy, and the great pectoral muscles cut near the insertion. Less than a half inch could be gained before cutting the pectorals. Much more than an inch afterwards. The blade of the osteotome was a quarter of an inch wide; it was made to enter the clavicle just outside the centre, and was directed toward the outer posterior corner of the bone. As the outer half of the clavicle is very thin, vertically, but in an antero-posterior direction widens greatly at the outward end, the cut surfaces of the bone were still in contact over a large area even when the outer fragment had uncovered an inch of the inner fragment. There was little tendency to displacement. Catgut sutures were used, one over the clavicle, two over the pectoral incisions on each side; small sterilized gauze dressings were applied with adhesive plaster strips, and a short light plaster of Paris jacket applied, carefully modelled over the shoulders, the upper chest and the back. She was allowed free use of the arms below the elbow; in two days she could sit up and feed herself; and in three days she was partially dressed, walking about the ward. The discomfort was very little, the wounds healed by first intention; when the plaster was removed in three weeks the right clavicle measured 5⅛ inches, the left 5¼ inches, a gain of ⅞ and of one inch respectively.

Three months after operation the gain was slight, but she was broader across the shoulders, and her parents were pleased. The back muscles were still very thin and weak; she was exercising them and slowly developing them.

Since then another year has passed. Her attitude is really much improved; she can assume a fairly normal position and the chest expansion is much greater, but it may still be necessary to straighten the scapulae by an operation. The writer hoped that if she could hold her shoulders in a fairly normal position for a year, the body of the scapula would straighten itself.

This is the only instance I have recognized of short clavicles. Was the condition due to an early arrest of growth in the bone during fetal life, or did it result from the unusual forces acting upon the clavicle from the over-powerful pectoral muscles opposed by very weak trapezii and rhomboid muscles and serratus.

Oblique osteotomy for lengthening a clavicle had been already performed by Dr. F. E. Peckham of Providence for a patient with considerable shortening from a healed fracture and scoliosis. This I did not know at the time I operated.

XI.

REMOVAL OF FOREIGN BODIES FROM THE OESOPHAGUS AND LOWER AIR PASSAGES IN CHILDREN.

BY D. CROSBY GREENE, M.D.,

AND

F. E. GARLAND, M.D.

DURING the past five years of our service at the Children's Hospital, we have removed foreign bodies obstructing the oesophagus or lower air passages in twenty cases, by means of endoscopy. Ten of these foreign bodies were located in the oesophagus, three in the larynx, three in the trachea, and four in the bronchi.[1] Prompt recovery followed in all but two of the cases. In one of these, a piece of fig in the left primary bronchus was not completely removed, and later caused a pulmonary abscess which resulted fatally several weeks after bronchoscopy. The other case was brought into the hospital in a state of prostration, having been mistakenly treated for a week for diphtheria, by successive intubations and several doses of antitoxin. The child was almost moribund at the time, and removal of a peanut from the left bronchus was followed by death in a few hours.

For obvious reasons the majority of foreign bodies lodged in the oesophagus or lower air passages are found in young children.

The problem of their removal in children as contrasted with that in adults presents two main differences: the first has to do with the anesthesia,[2] and the second with the smaller calibre of the passages. Whereas in adults with a moderate degree of self control local

anesthesia may be successfully employed, we are convinced that in children peroral endoscopy can be performed more successfully, with less trauma, and with less shock to the patient under a carefully conducted general anesthesia combined with local anesthesia. An exception is made in those cases in which the foreign body is of sufficient size to produce marked obstruction of the larynx or trachea. In such cases we have done tracheotomy under local anesthesia. In most cases we have used ether preceded one hour by a subcutaneous injection of atropine in the dose appropriate to the age of the child and enough to produce a distinct physiological effect. Ether is administered slowly by the open method, and when the child is deeply narcotized, the larynx and trachea are swabbed with a solution of cocain (10%) and adrenalin (1 to 1000.)[3]

If these preliminaries are carried out, the patient is brought up to the stage of operation with the larynx, trachea, and bronchi comparatively free of mucous, and conditions are most favorable for rapid discovery and extraction of the foreign body. The importance of these preliminaries can only be realized by one who has tried to work in the trachea and bronchi of a patient in whom they have been omitted. The presence of copious mucus and the irritability of the mucous membrane, made worse by the constant swabbing which is necessary in order to clear the field, combine to enhance many times the difficulties of the procedure.

The smaller calibre of the air passages in children naturally necessitates the use of smaller tubes in bronchoscopy and oesophagoscopy. We have found in practice that a tube 7 m. m. in diameter is small enough to permit exploration of the main bronchi in the smallest children. The bronchoscopes used are all of Jackson's pattern. For laryngeal work we have used both Jackson's and Mosher's small specula. The latter has proved to have a distinct advantage over the former in operative work by reason of its open construction which permits a better view of the field when instruments are being introduced and used. In oesophageal work we give the preference to Mosher's oval oesophagoscopes, because the oval shape in a lumen of a given circumference again gives better opportunity for operative work. Altogether the best forceps which we have used is Coolidge's. It combines admirably two essential mechanical features: (1) it is operated by a handle and trigger entirely outside the line of vision; (2) closure of the forceps is accomplished without any movement of the blades in the line of direction toward or away from the object to be grasped. The same handle may be used for long or short distance work, by fitting to it the tips of appropriate length.

The anesthetized patient is put in the dorsal recumbent position with the head hanging over the end of the operating table and supported by an assistant. The laryngeal speculum is then introduced and inspection made of the hypopharynx and larynx. If the oesophagus is to be explored, the laryngeal speculum is now withdrawn and an oesophagoscope with mandrin guide is then manipulated into the oesophagus. As soon as the upper constriction of the oesophagus is passed, the mandrin is withdrawn and the oesophagoscope slowly passed downwards, the lumen being always kept in view for inspection.

If the trachea or bronchi are to be explored, the laryngeal speculum is not withdrawn until, after cocainization of the larynx and trachea, a bronchoscope has been passed through the glottis into the trachea. The speculum is then withdrawn and the bronchoscope passed downward through the trachea into the bronchi.

Peroral endoscopy is not indicated for recovery of a foreign body of considerable size obstructing the trachea, such as a peanut or a bean. Such objects are likely to slip out of the grasp of the forceps in the attempt at extraction, and an emergency tracheotomy under difficult conditions may be required. It seems to us much better to open the trachea at the start, under local anesthesia if the dyspnea is severe, and carry on endoscopy through the tracheal opening.

REFERENCES.

[1] The objects recovered from the esophagus were: 1 collar button, 1 medal, 1 Canadian two-cent piece, 2 one-cent pieces, 1 orange pulp, 1 piece of bent wire, 2 twenty-five cent. pieces, 1 cherry stone, 1 piece of beef; from the larynx: 1 piece of egg shell, 1 piece of peanut shell, 1 piece of tin; from the trachea: 1 peanut, 1 piece of glass, 1 broken tracheal cannula; from the bronchi: 1 piece of fig, and fragments of peanuts in three cases.

[2] Jackson has recently advocated doing peroral endoscopy in children without any anesthesia. We believe that our record indicates the safety of general anesthesia under proper precautions—while its advantages are obvious.

[3] When the esophagus only is to be examined, local anesthetization is omitted.

XII.

THE INFLUENCE OF ALKALIES UPON GASTRIC MOTILITY.

BY MAYNARD LADD, M.D.

THE purpose of the work which forms the basis of this preliminary study has been to determine the effects of alkalies upon gastric motility in infants so far as they can be demonstrated by serial radiographs taken after the administration of milk-mixtures containing bismuth.

The use of alkalies, such as lime water and bicarbonate of soda, has been a common practice in infant feeding. Recently considerable doubt has been expressed, both as to the desirability of their use and as to whether their action is that which is theoretically claimed for them. When lime water or sodium bicarbonate is added to cow's milk, a basic calcium or sodi-

um-casein is formed which is not acted upon by rennet and will not form a curd even in the presence of soluble calcium salts. It would seem, therefore, that a considerable degree of alkalinity in a milk mixture would suspend gastric digestion by its inhibitory action upon rennet coagulation and, therefore, by allowing rapid emptying of the stomach throw the burden of digestion upon the duodenum. Whether this action really occurs ought to be demonstrable by means of serial radiographs of the infant's stomach. The other reasons for or against the use of alkalies in infant feeding do not enter into the scope of this investigation.

There are certain facts in regard to gastric motility observed in infants by this method which may be briefly stated in review, as bearing upon this subject. In two previous papers I have drawn inferences which my subsequent work has strengthened.* The cases studied to date represent 15 different infants, 36 series of experiments and about 275 radiographs. This is a comparatively small number, but allows us to make certain observations which are probably correct.

First of all, irrespective of the age of the child, or of the composition of the food, the gastric contents begin to pass into the duodenum at once and with considerable rapidity, until at the end of two hours, in the majority of cases, by far the greater part of the feeding has been expelled. The rate of discharge into the duodenum then becomes much slower and under certain conditions the emptying time may be greatly prolonged before it is complete. A new feeding tends to stimulate peristalsis and to push out ahead of it the residue of the previous feeding. If no new feeding is introduced, the emptying time depends partly upon the character of the food and partly upon the individual equation of the infant, or upon conditions of digestion which can not be determined by serial radiography.

As examples of this personal equation in gastric motility, I may mention three infants of approximately the same age and taking the same formula and the same amount at a feeding, who required one 2½, one 3¾ and one 4½ hours to empty the stomach.

The same three infants on another fomula required one 7½, one 4½ and one 6 hours for complete emptying of the stomach.

Moreover, in the same infants, we see marked differences in the rate at which the food leaves the stomach, which depend upon variations in the composition of the mixture. One infant of 7 months, for instance, required on different occasions, 2½, 4½, 7½ and 6 hours for complete emptying of the stomach, according to the character of the food given. The details of the experiments upon which these statements are made may be found in the articles to which I have referred.

I have not been able to show that the emptying time is always uniform in the same baby for a given formula. In fact, it is very evident that certain states of digestion occur which influence decidedly the gastric motility even when there has been no change in the food. This fact makes it difficult to draw definite conclusions as to the influence of variations in the composition of the food upon molitiy. It would appear that under certain conditions, not easily explained, stasis results and food remains in the stomach for many hours, unless its expulsion is encouraged by giving a new feeding.

So far as I have been able to determine, neither the percentage of sugar (up to the limit of 7 per cent.), nor its variety (lactose or maltose), has any influence upon gastric motility.

If the proteins are kept low, even the fats fail to show any constant tendency to prolong the emptying time, which, in several of my experiments, was the same whether the mixture was fat free or contained an amount of fat as high as four per cent. If the percentage of fat influences the motility at all, the effect is not striking.

In regard to the casein, however, we do see a marked effect upon motility, depending upon whether the percentage of casein is very low or very high and more particularly according to the form in which it is given. I have found generally that the full protein of milk (3.50%) considerably prolongs the emptying time, but that this effect is much more marked in some instances than in others. For example, in one child, the difference in the emptying time between a whey protein mixture of .90/.60 and one of 3.50 total protein (the fat and sugar being the same), was 2½ hours and 6½ hours. On the other hand, another child accustomed to high proteins from birth, took 4½ hours to empty its stomach on this same mixture containing 3.50 per cent. casein.

When the casein is converted into a non-coagulable form either by precipitation, or by the action of lactic acid cultures, forming the lactate of casein, the emptying time is much accelerated —varying from 2½ to 3 and 3½ hours. This is the most constant effect of variation in the composition of the food elements which I have been able to observe.

Whether the amount of energy involved in the digestion of food is influenced by the time it stays in the stomach is a point which seems to me of some importance in metabolism experiments upon infants. For example, in one experiment, an infant on a 0.00 fat, 6.6 sugar, and 3.50 protein required 6 hours to empty its stomach; the same infant on the same percentage formula but with the casein precipitated, discharged its contents into the duodenum in 2½ hours. The caloric value of the food was the same in each case, but the difference in the form in which the casein was given made a difference of 3½ hours in the emptying time. It would seem as if a greater amount of work was done in one case

* "Gastric Motility in Infants as Shown by the Roentgen Ray." *Am. Jour. Dis. Children*, May, 1913, vol. 5, pp. 345-358; and "Influence of Variations of Diet Upon Gastric Motility in Infants," *Arch. Ped.*, October, 1913.

than in another. Whether or not this is a point of importance in metabolism experiments, it is certainly one which must always be considered when we are taking serial radiographs for the purpose of determining gastric stasis in infants.

The following experiments to determine the influence of considerable quantities of alkalies on gastric motility, must always be judged in reference to the foregoing facts. There have been three infants studied. The results in each series may be briefly summarized as follows:

FIRST SERIES.

1. McGINNIS, Nov 18. A breast fed infant of three and a half months. Two level teaspoonfuls of bismuth subcarbonate were given in one ounce of water and the baby was allowed to nurse until the amount of the feeding was four ounces in weight. Feeding began at 9.30 a.m. Radiographs at 10 a. m., 12, 1, 1.30. Breast feeding without bismuth at 1 p. m. Plates show considerable residue at the end of 3½ hours. The last plate shows very clearly how the new feeding pushes the residue of the old feeding into the pyloric end of the stomach without mixing intimately with it.

2. McGINNIS, Dec. 1. The same procedure was carried out in the second series, except that one ounce of lime water was given in place of the plain water, making the lime water 25% of the total mixture of breast milk. Feeding begun at 9.30 a. m. Radiographs at 10 a. m., 12, 1.15. The last plate shows the stomach practically emptied in 3¾ hours in contrast to the large residue after 3½ hours in the previous experiment in which no lime water was given. Considerable difference is shown in the amount of stomach contents in the two plates at the end of the two hours; after the feeding with lime water the residue is considerably less, but the most striking feature is the rapid discharge in the last 1¾ hours.

SECOND SERIES.

1. POMMETT, Nov. 17. Three and one-half months. The food in this series was: Fat .0.00, Lactose 6.50, Protein 1.75. No alkalinity. Amount 3½ ounces. Tube feeding at 9 a. m. Radiographs at 9, 11, 12, 2. Stomach practically empty in five hours. This series represents very typically the normal discharge of the gastric contents on such a mixture. Notice the very slight change in the condition during the third hour of digestion.

2. Nov. 9. Same formula. Lime water, 25% of the total mixture. Tube feeding at 12.15 M. Radiographs at 12.15, 2.15, 3.15 and 4.10. Stomach practically empty in four hours (one hour less than in the series without lime water.) Notice the rapid discharge of the contents during the third hour of digestion.

3. Nov. 24. Same formula. Lime water 50% of the total mixture. Tube feeding at 11 a. m. Radiographs at 11, 1, 2.15. Stomach practically empty in 3¼ hours. The discharge of the contents in the third hour is still more rapid than in the series of Nov. 19.

The presence of lime water in this series apparently hastened the discharge of food into the duodenum, by 1 hour and 1¾ hours, respectively.

4. Nov. 26. Same formula, protein in form of precipitated casein. No alkalinity. Tube feeding at 11. Radiographs at 11, 1, 2.30. Stomach practically empty in 3½ hours. That is, when the casein was previously precipitated, the discharge of the contents was practically as rapid as in the series of Nov. 24, when 50% of the total mixture was lime water.

5. Nov. 29. Same formula. Protein in form of precipitated caesin. Lime water 25% of total mixture. Tube feeding at 11.30 a. m. Radiographs at 11.30, 1.30. Stomach empty in two hours.

This experiment loses some of its significance in view of the fact that much of the casein became clogged in the tube so that the stomach contents were largely a sugar solution and bismuth. It is interesting, however, to note the rapid disposal of the bismuth, in the absence of any considerable amount of casein.

6. Dec. 2 Repetition of experiment of Nov. 29. Tube feeding at 9.30 a. m. Radiographs at 9.30, 11.30, 12.30, 1.15. Stomach practically empty in 3¾ hours.

Experiments 4 and 6, apparently indicate that when the casein is already precipated before administration, the lime water has no marked effect upon gastric motility, the discharge of the food into the duodenum being hastened by the subdivided condition of the casein, the lime water itself exerting no influence.

7. Dec. 4. Same formula. Protein in form of precipitated casein. Lime water 50% of the total mixture. Tube feeding at 10.30. Radiographs at 10.45, 12.30, 1.30, 2.30, 3.30. Stomach practically empty in five hours.

In this series, with lime 50% of the total mixture, considerable stasis is seen to exist during the third hour of digestion and the emptying time as a whole is prolonged. A similar, and even more pronounced state of stasis is seen in the third series, Dec. 15 (below).

THIRD SERIES.

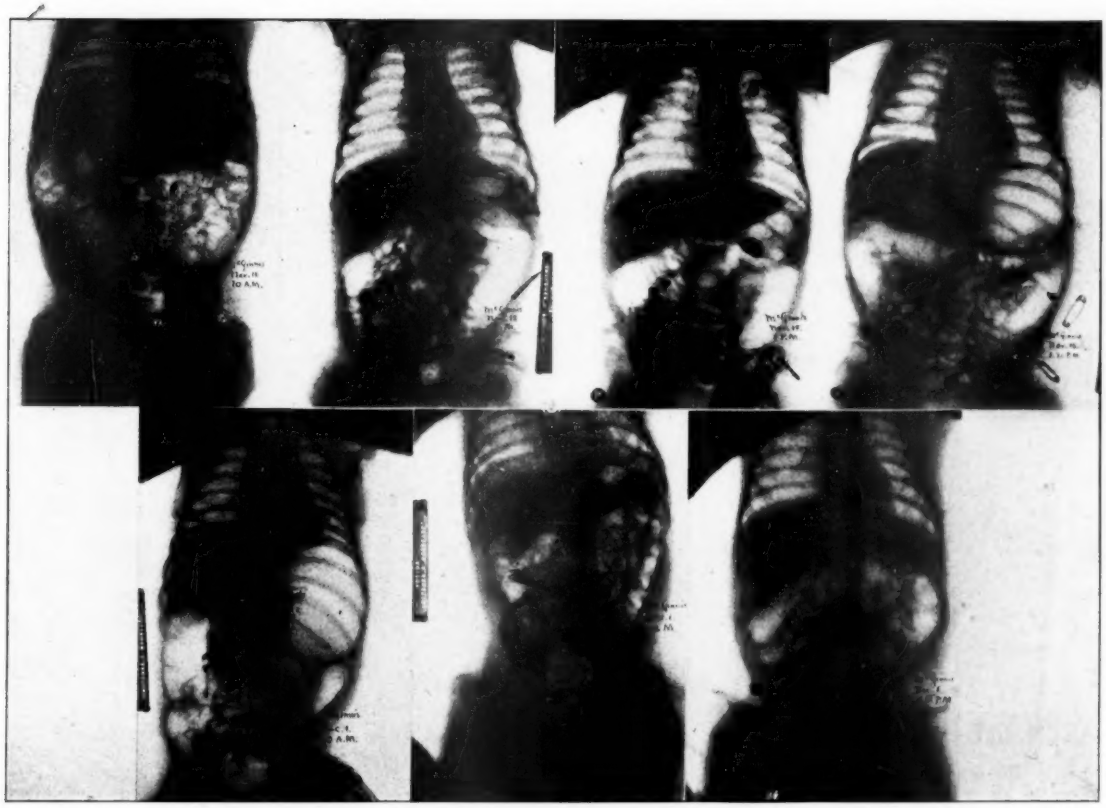
CUNNINGHAM. 8½ months. The food in this series was: Fat 2.00, Lactose 7.00, Protein 2.25. Amount seven ounces.

1. Dec. 13. No lime water. Tube feeding at 9 a. m. Radiographs at 9. 11.45, 1.15, 2. Stomach practically empty in five hours. Compare with Pommett, Nov. 17. The normal emptying time was the same for an infant of 8½ months, taking seven ounces, as for one of 3½ months taking 3½ ounces.

First Series.

McGinnis. Nov. 18.

10 A. M. 12 M. 1 P. M. 1.30 P. M.



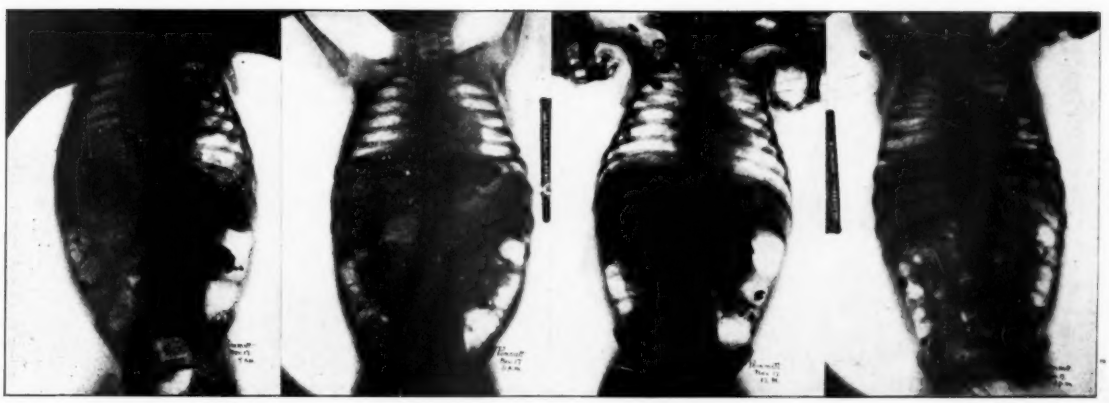
10 A. M. 12 M. 1.15 P. M.

McGinnis. Dec. 1.

Second Series.

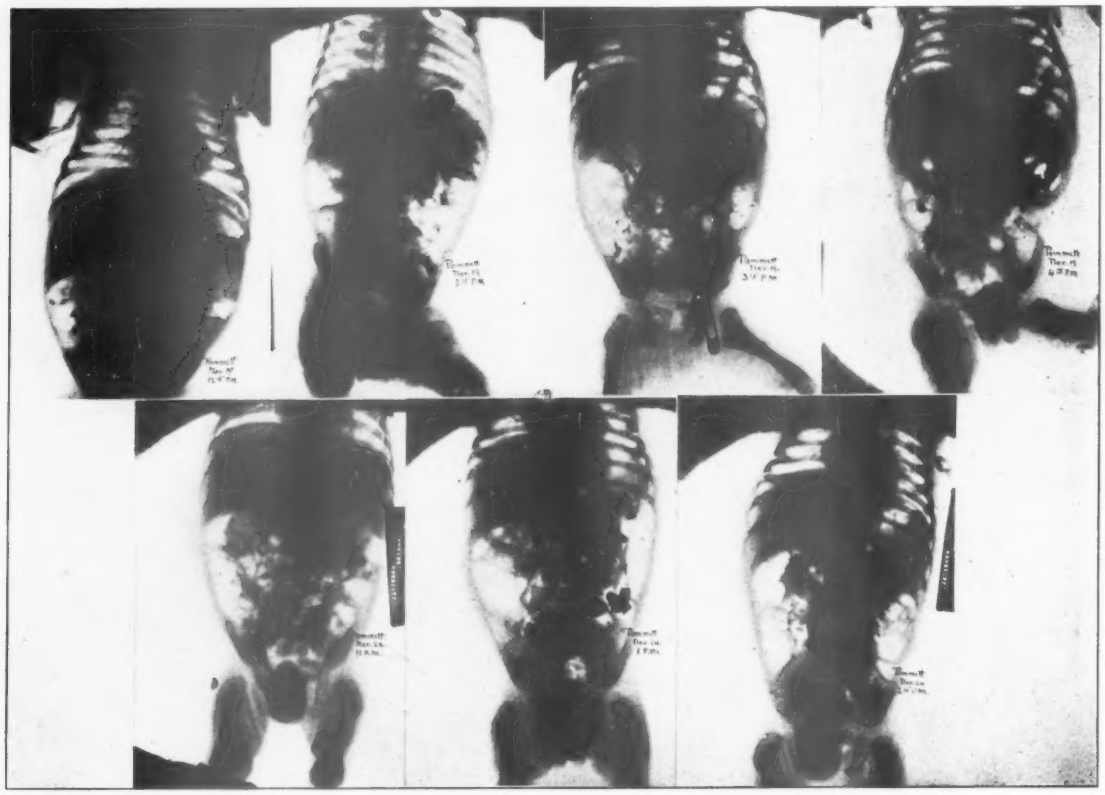
Pommett. Nov. 17.

9 A. M. 11 A. M. 12 M. 2 P. M.



Pommett. Nov. 19.

12.15 P. M. 2.15 P. M. 3.15 P. M. 4.10 P. M.

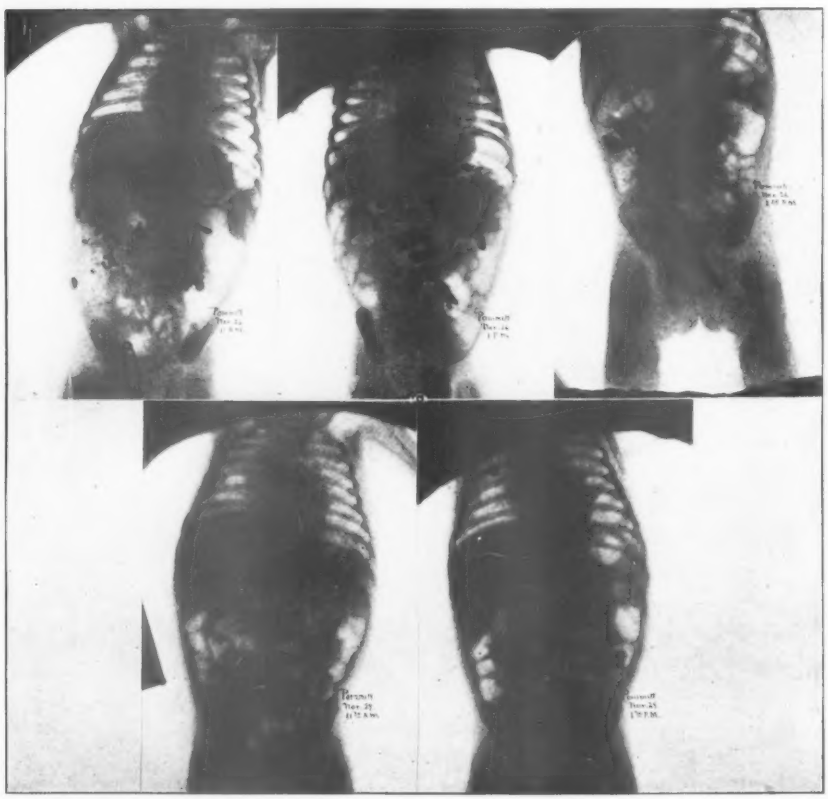


11 A. M. 1 P. M. 2.15 P. M.

Pommett. Nov. 24.

Pommett. Nov. 26.

11 A. M. 1 P. M. 2.30 P. M.

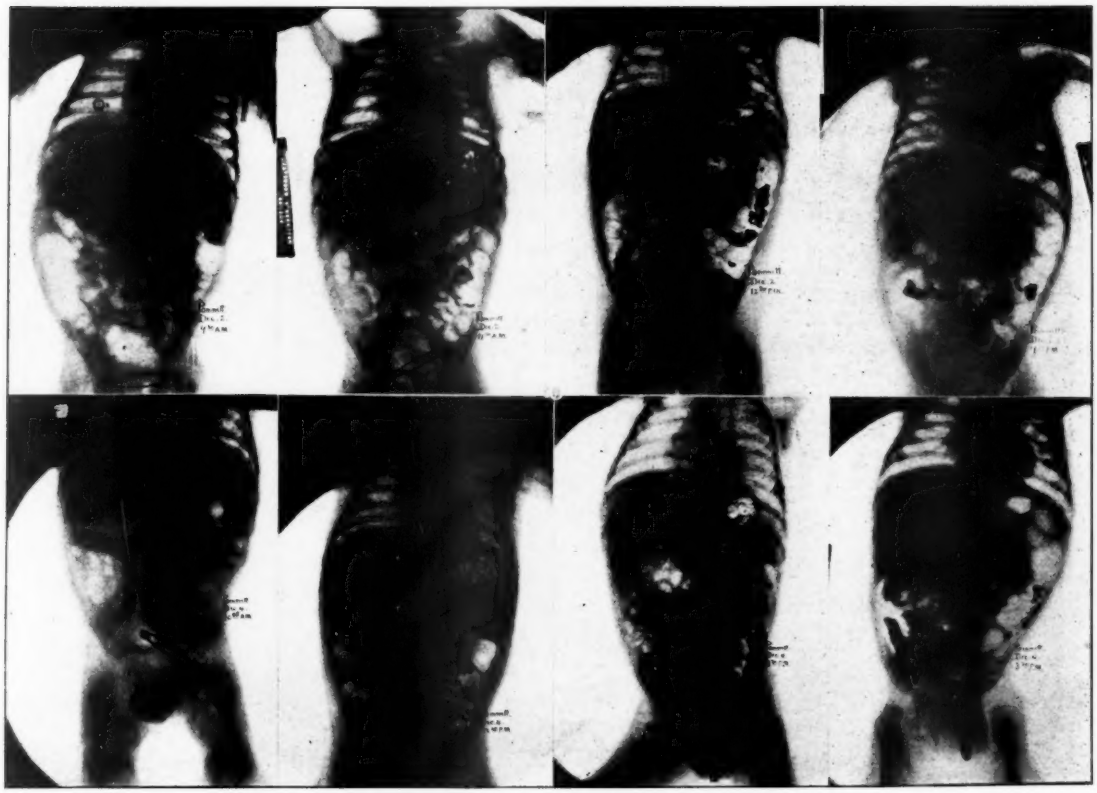


11.30 A. M. 1.30 P. M.

Pommett. Nov. 29.

Pommett. Dec. 2.

9.30 A. M. 11.30 A. M. 12.30 P. M. 1.15 P. M.



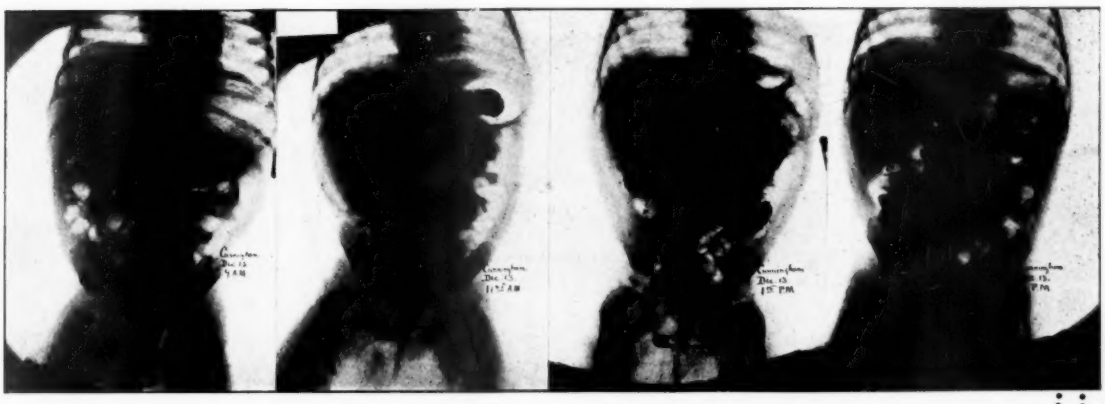
10.45 A. M. 12.30 P. M. 1.30 P. M. 3.30 P. M.

Pommett. Dec. 4.

Third Series.

Cunningham. Dec. 13.

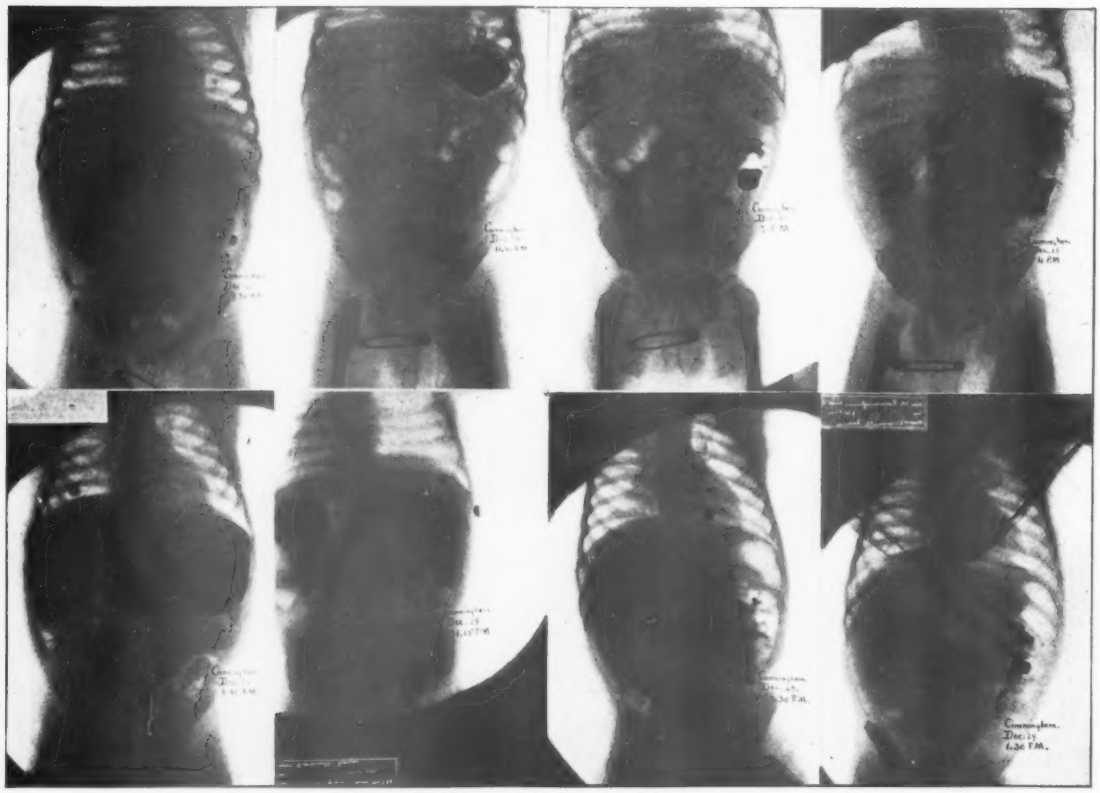
9. A. M. 11.45 A. M. 1.15 P. M. 2 P. M.



UofM

Cunningham. Dec. 15.

9.30 A. M. 11.30 A. M. 2 P. M. 4 P. M.

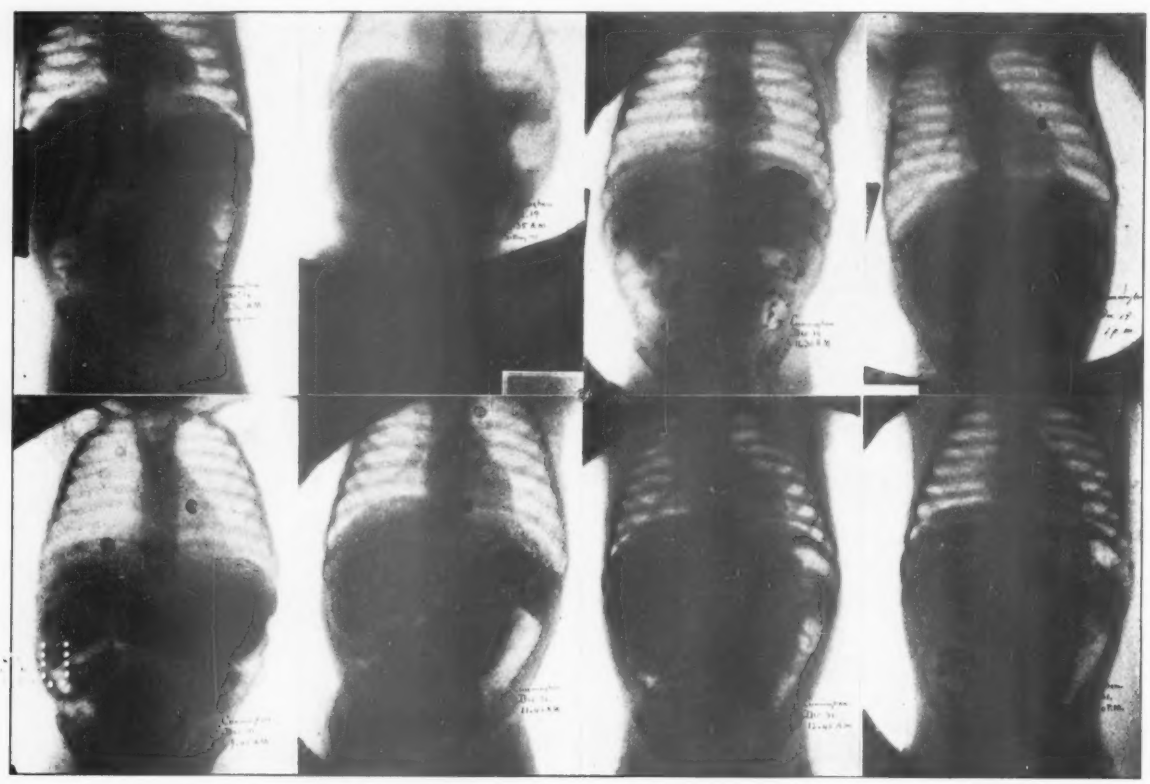


9.30 A. M. 11.15 A. M. 12.30 P. M. 1.30 P. M.

Cunningham. Dec. 29.

Cunningham. Dec. 19.

9.30 A. M. Sitting up. 9.35 A. M. Lying down. 11.30 A. M. 1 P. M.

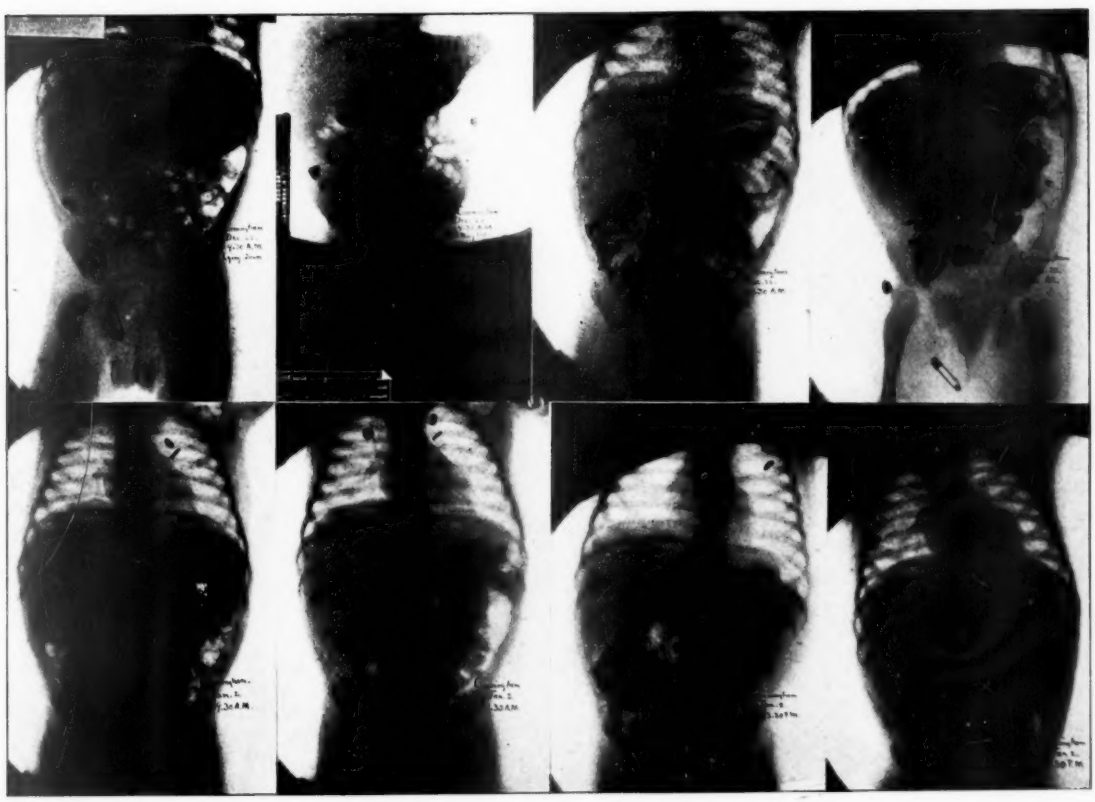


9.45 A. M. 11.45 A. M. 12.45 P. M. 2.10 P. M.

Cunningham. Dec. 31.

Cunningham. Dec. 22.

9.30 A. M. Sitting up. | 9.35 A.M. Lying down. | 11.30 A. M. | 12 M.



9.30 A. M. | 11.30 A. M. | 12.30 P.M. | 2 P. M.

Cunningham. Jan. 2.

2A. Dec. 15. Same formula. Lime water 25% of total mixture. Tube feeding at 9 a. m. Radiographs at 9.30, 11.30, 1, 2, 3, and 4 p. m. Stomach still contains food at seven hours.

This case illustrates the occasional condition of stasis one sees when the food is high in casein.

2B. Dec. 29. Repetition of 2A. Tube feeding at 9.30 a. m. Radiographs at 9.30, 11.15, 12.30, 1.30. Stomach practically empty in three hours.

The experiment 2 B. is similar in result to that in the McGinnis and Pommett series, the emptying time being diminished by 2 hours, when the feeding was strongly alkaline. The anomalous condition of stasis in 2 A. is difficult to explain with any degree of certainty.

3A. Dec. 19. Same formula. Sodium citrate, 14 grains. Tube feeding at 7.30. Radiographs at 9.30 lying down, 9.35 sitting up, 11.30 and 1 p. m. Stomach practically empty in 5½ hours. The difference in position when the body is erect, causes the pyloric end of the stomach to be slightly lowered, the cardiac portion remaining unaffected.

3B. Dec. 31. Repetition of 3A. Tube feeding at 9.45 a. m. Radiographs at 9.45, 11.45, 12.45 and 2.10. Stomach practically empty in 4½ hours.

The influence of sodium citrate in this series would, therefore, seem to be very little as far as gastric motility is concerned. It is certainly less marked than in the series in which lime water and sodium bicarbonate (see below) were use.

4A. Dec. 22. Same formula. Sodium bicarbonate 14 grains. Tube feeding 9.30. Radiographs at 9.30 lying down, 9.35 sitting up, 11.30, 12. Stomach practically empty in 2½ hours.

4B. Jan. 2. Repetition of 4A. Tube feeding at 9.30 a. m. Radiographs at 9.30, 11.30, 12.30, and 2. Stomach practically empty in four hours.

The action of sodium bicarbonate is, on the whole, even more striking than that of lime water, but the difference may not be borne out in a larger series of cases.

In this preliminary work, I have made no effort to attempt to judge of the effects of anything but large amounts of alkalies. Lime water and bicarbonate of soda unquestionably tend to hasten the discharge of the gastric contents into the duodenum. This effect is sometimes seen in the more rapid discharge of the contents in the first two hours of digestion, but that difference is not as striking as one would expect from the theories in regard to the use of alkalies which have previously been held. The most important point brought out by these experiments is the shortening of the latter half or the digestive period by the use of alkalies. The effect on gastric motility is, therefore, probably due almost wholly to the action of alkalies, upon the casein curd.

XIII.

A Study of the Etiology in One Hundred and Seventy-Five Epileptic Children.

By Arthur Willard Fairbanks, M.D.

Notwithstanding the fact that epilepsy is one of the oldest of diseases its causation still remains a matter of uncertainty and contention, although a vast mass of literature exists concerning this particular phase of the subject.

I believe that this is due in great part to two facts. In the first place the conditions embraced in the term "Epilepsy" was for many generations regarded as a disease, *sui generi* and even at the present time this view seems to still persist, if one may judge by the argument employed by many writers, especially those who advocate the hereditary theory of the affection. In the second place, and this seems to me the more important of the two facts, the great majority of published statistics deal with cases studied in adults, or present data obtained from clinical material of all ages.

It is the main purpose of this paper to show that the truth concerning the cause of the majority of epileptic cases cannot be determined by the exclusive study of adult material, while the inclusion of the incomplete data obtained from such cases, with the more accurate data obtainable from the parents in the case of the child, cannot fail to lessen the value of the latter, and lead to erroneous conclusions as to the real incidence of acquired epilepsy as compared with the inherited affection. To return however for the moment to the first proposition. It would seem trite to say that epilepsy is a condition not a disease, were it not for the evidence that the old conception continues to prevail. Epilepsy cannot be regarded as a disease in the sense in which the term should be strictly employed. The longer one studies the cases that come under his observation the more he will find it impossible to give a concise and unqualified definition of any clinical entity, or in other words a disease that as such may be termed "Epilepsy," and the stronger will become his conviction that the state so designated is merely an instability of the central nervous organization; an inability of the nerve centres to maintain their equilibrium in the presence of either ordinary or extraordinary stimulation from without. The frequency, the persistency, and the degree of this instability of the central nervous system furnish us with a convenient basis of classification, which is however merely a convenience, and in no respect a justification for arbitrary nosological differentiation.

The real question of moment in any single case is not "Is this epilepsy or is it not?" but "Why does this individual's central nervous

system respond in this manner to these stimuli, wherever they may arise or whatever their nature may happen to be, when the central nervous system of other individuals does not so react?"

From this point of view all of the innumerable exciting factors of the individual attacks, so often emphasized as of importance in the etiology of epilepsy, become immaterial in so-far as the solution of the real cause of the unstable state of the individual is concerned. They are merely the immediately exciting factors that for the moment overthrow the poorly balanced nervous system. Over-emphasis of these exciting factors of individual epileptic or eclamptic attack serves rather to cloud than to clarify our understanding of the fundamental cause of the condition. Innumerable articles have appeared, and are constantly appearing, in medical literature, the sole purport of which is the attempt to prove this or that exciting factor the real or fundamental causation of epilepsy. This tendency, persisting even at the present time, is to be deplored, for it only delays the recognition of the fact that every conceivable external stimulus may be sufficient to overthrow the static balance of the central nervous mechanism when its static balance is below the normal average of stability, and only then. What are the conditions that are responsible for this defective equilibrium? We must first consider the conditions that make the normal development of stability impossible. In the first place the parent cells may not be endowed with those inherent qualities that permit the ultimate attainment of relative stability in the developed organism. In such instances the instability is inherited. It is of course impossible to assert the existence of this inherited instability unless there exists in the history of the ascendents of the individual positive evidence of similar instability.

Second, given parent cells with normal inherent stable qualities, some influence such as trauma or disease in the mother, (or in the placenta, after the third month) may be brought to bear on the embryo in utero to impair the development of the central nervous system, and consequently to prevent the evolution of stability. Such injuries to the embryonic development, if they occur during the first three months of pregnancy, may be evident otherwise in the form of anatomical defects or malformations, and, even later, abnormalities in the pregnancy, especially those associated with insufficient room in utero for the proper developments of the foetus, (as in the case of twins) may produce marked anatomical defects, particularly microcephalus. In the absence of such gross defects, only the history of some disturbance of the normal course of pregnancy will suggest the possible injury of the embryo. Any condition however that has retarded the cerebral development of the foetus at any time during the first eight months, is extremely likely to produce some degree of microcephalus, evident at birth. When present it is extremely suggestive of some disturbance of the normal conditions of pregnancy. It may be relative to the otherwise normal physical development of the child or it may be but a part of a general defective physical development. Its importance as far as antenatal origin is concerned lies in its being present at birth. Premature termination of the pregnancy, by sending the child into the world in an immature and therefore unstable state, is also occasionally an undoubted factor.

Third, with the embryo normally developed, there still remains, as a possible factor in impairment of stability, the incidence of trauma and disease. The period of birth is the time in the life of every child when the brain is exposed to the greatest danger. It is at this period, therefore that we would expect to find the origin of structural damage of the brain, and in fact do find frequent evidence of such structural damage, with a history of some abnormality of birth as a probable cause of the injury.

Let us consider some of the incidents of birth that may cause injury to the cerebral structure. An unusually large head passing through a pelvic strait of normal diameter may require so much compression of the cranial bones that injury to the cranial contents is unavoidable, or a normal head of average diameter passing through a pelvic canal of minor diameters may entail similar damage. Then also a normal head may be forced through a normal pelvis with such rapidity by unusually forceful contractions of the uterus that there is no time for gradual accommodation of the cranial bones to the passage through which they must pass and rapid cranial compression occurs without consideration for the safety of the underlying brain and serious damage results. This I am confident is not rarely a cause of injury. It is however usually overlooked because the labor is described by the mother as "an easy one" and this is accepted as evidence that it has also been an easy one for the child, which is by no means necessarily the fact. I have had reason for years to regard those labors in which the child is born after a few short strong pains, often before the accoucheur's arrival, as by no means favorable for the child. The greatest care must be observed in taking the birth history of a child not to too readily accept the mother's assurance that the labor "was normal." She is referring to her own experience rather than to that of the child. Not infrequently, when we have received assurance that the birth was normal, it will be found by careful enquiry that, as a matter of fact, the child was more or less asphyxiated, and that some effort was necessary to induce respiration. Such a fact must be given full value as a possible source of cerebral injury. Also in labors in which the baby is born before the physician's arrival the

possibility of a twisted cord with its secondary effect on the cerebral circulation always should be borne in mind. In other instances owing to inertia or to minor pelvis in the mother, or to a large head, etc., it may become necessary to apply forceps, which may produce cerebral damage directly, or indirectly by rapid extraction of the head before it has an opportunity to adapt itself to the passage through the pelvis.

In breech presentations with rapid delivery of the after-coming head there may be resultant injury either directly by compression or through venous engorgement consequent on the delayed delivery of the head. Long delay of an otherwise normal labor by premature rupture of the membranes may also be attended by cerebral trauma. Often when we do not obtain any positive history of abnormal labor from the mother we may see positive evidence of it in the child in the shape of gross cranial deformity, or by the presence of cranial scars, or spastic paralysis, convulsions during the first few days or weeks subsequent to birth, or by marked delay in the early development of the infant. The numerous contingencies, above referred to, indicate how great is the danger to which the child's brain is exposed during birth.

After birth there exists throughout the years of childhood the incidence of trauma and disease as cause of cerebral injury. The permanent structural damage produced by diseases that directly affect the brain, as meningitis, encephalitis and hydrocephalus, is a matter of common clinical observation, while it is by no means a rare clinical experience to observe the serious injury done to the central nervous structure by the infectious diseases, either directly by the action of their toxin or indirectly through vascular lesions. All of these many sources of acquired cerebral damage must be considered when we are searching for the etiology of chronic cerebral disturbance or defect.

We find that they are the most common factor in the production of spastic paralysis and of mental deficiency in childhood, and we shall find that they are the largest single positive feature of the histories we obtain in the study of epileptic children.

I have selected 175 cases of epileptic children in which accurate data in reference to the family and personal history were obtained, and careful examinations were made for objective evidence of cerebral injury or physical defects. These cases were chosen solely on account of the completeness of the historic and clinical data. Otherwise they were taken consecutively in the order of their first visit to the hospital. They comprise children up to the fourteenth year inclusive.

In a critical study of these cases with reference to the etiology we find that the most careful enquiry revealed, in only 12 instances, any trace of convulsive attacks or of petit mal in the ancestors or in other members of the family.

In all of these cases however the hereditary taint was pronounced and in striking contrast to all of the rest of the series. Two fathers were epileptic; one mother had petit mal in childhood and another convulsions in childhood and two of her children, brothers of my patient, died in convulsions in early childhood. In another instance the parents were unaffected but another of their children died in convulsions and two cousins were epileptic. In the case of a child of 3, a maternal cousin, a boy of 10 was epileptic and a paternal aunt insane. The rest of these cases presented an equally marked familial taint. It is an interesting fact that only two of these children presented other evidence than the epilepsy of cerebral defect, namely, mental deficiency, and one of them born prematurely and the other by the use of instruments. They were the only instances of this series in which there was anything abnormal about the birth. The familial taint was definite however in both cases. In none of this series was spastic paralysis present.

One case I am unable to classify, but it should perhaps be mentioned here and may belong to the hereditary series. This was a child of 8 years, whose paternal uncle was epileptic. The boy presented marked degenerative stigmata, in the form of web fingers, supernumerary toes, cryptorchism and hypospadias. In addition he was hydrocephalic and had Hutchinsonian teeth. He was born after severe prolonged labor with the cord twisted about his neck, and he was idiotic and diplegic. The convulsions appeared immediately after birth lasting all night, and recurred for twenty-one months with great frequency, and thereafter infrequently to the eighth year. There can be no doubt that this child was injured at birth but there is equally little doubt that there was a syphilitic as well as a familial degenerative taint.

I do not find among my cases any that can be ascribed to disease during pregnancy, with the exception possibly of some of the syphilitic cases which will be considered in a class by themselves later.

Two cases were exposed to trauma during pregnancy by the attempt to induce miscarriage which had been successful several times previously. Both cases were born at term. Both of these children showed other indications of cerebral injury. One was feeble-minded, and had strabismus, the other increase of the deep reflexes and unsteady gait. In two cases trauma was undoubtedly the cause of premature birth. These will be considered under that classification.

In four instances the children were the product of twin pregnancies. All were born at term. Two presented other signs of organic brain defect. One was a light case of mental deficiency and showed a hemiparesis, the other

was mentally defective. In both of these cases, and in one of the others the other twin died in early infancy.

In only one case was it possible to ascertain whether the patient was the first or second delivered. That one was the first born, the other child dying at 7 months of "weakness."

In six instances the children were born prematurely, 2 at 7 months, the others at 8 months. In two of these instances the mothers suffered falls in the fifth month of pregnancy (one 7 months child) and in the seventh month of pregnancy (an 8 months child) respectively. Both of these children were feeble minded, and one was also blind. The others presented no cerebral defects except the convulsive attacks. One child however presented anatomical degenerative stigmata, in the teeth, face, palate, and ears. Beyond the statement that the mother and her family were "nervous" there was an entirely negative family history in this case.

In 43 cases there were conditions during the birth of the children that exposed the brain to extraordinary danger. Of these, 14 were born after severe or prolonged labor, by the aid of forceps, but not asphyxiated. Of these, 8 were feeble minded, 3 were hemiplegic, 1 was diplegic, and 2 showed marks of cranial trauma at birth. Both of the latter were feeble minded, as were also the diplegic and one hemiplegic, and are included among the 8 mentioned as mentally defective. Ten were born by the use of forceps and were asphyxiated. Of these, 4 were feeble minded, 3 were hemiplegic, one paraplegic, and 3 showed definite marks of cranial trauma at birth. Two of the hemiplegics and the paraplegic were mentally defective, as were also 2 of those presenting evidence at birth of cranial trauma. One case was not only feeble minded and hemiplegic but also showed marks of cranial injury. One of the series was one of twins, the other child being still-born, and this may also have been a factor.

Six were born after severe labor but without the use of forceps and as far as known not asphyxiated. Of these 4 were feeble minded. None of them were paralytic.

Four were born after severe labor, without forceps, and were asphyxiated. Of these, 2 were feeble minded and one of these was also paraplegic.

Two were large children born, after severe labor, with forceps. These presented no cerebral defect other than the epilepsy.

Two were born after prolonged dry labor, and one was asphyxiated. The other child was feeble minded. Two were born quickly before the doctor's arrival. One was feeble minded and the other was hemiplegic. Of the remaining cases of this series 1 was a brow presentation with forceps delivery; another a footling, born after severe labor and asphyxiated, and the other was a placenta praevia case. These cases were the only cases in the series that did not show some evidence of cerebral abnormality, other than the epilepsy itself. Thus of these epileptic children, whose birth was in some one or more respects abnormal, 70% presented other evidence of cerebral defect than the epilepsy, and 23% presented objective evidence of structural damage of the brain in the form of spastic paralysis, and 14% presented evidence of cranial injury, two of these being spastic.

The high percentage of cerebral defects in these children, even exclusive of the epilepsy, indicates how frequent is the incidence of cerebral trauma during birth. When we consider how many births, considered normal by the mother and by the physician, may not really be so for the child, but may be attended by slight injury not producing gross evidence of its presence, we may understand how this slight structural injury may later make its existence evident in the form of epilepsy or mental defect.

Eight cases were probably syphilitic in origin. In all but two the effect of the disease was very evident in the many miscarriages and early infant mortality shown by the history. In one of the two exceptions the father acquired syphilis 7 years before the child's birth and one of his children died in convulsions 2 to 3 months old. The father of the other child died of "softening of the brain" while the case was under observation. Five of the 8 cases were mentally defective. One child of 3 years who had had innumerable attacks of all degrees of severity from its earliest infancy promptly responded to iodide of potassium, improved markedly in intelligence and no recurrence of the epilepsy occurred although the child was under observation for a year afterwards. These cases do not respond to bromide to any material degree.

Fifteen of the series had suffered cranial injury after birth and antecedent to the appearance of the epilepsy. Many of these injuries were accompanied by immediately serious symptoms; unconsciousness from half an hour to thirty-six hours, vomiting, hemiparesis, facial paresis, and in one case blindness and deafness for four weeks, while others did not seem at the time seriously hurt, but soon showed mental deterioration. One case will suffice to illustrate this. This child developed normally to the beginning of the second year when she had a fall, and three months later another, striking her right side. Mental progress ceased and when examined she showed a left hemiparesis. The epilepsy appeared shortly after the fall and was at first concentrated on the left. These cases are of very instructive character, but it is not possible within the limits of this paper to cite their details. Two of the children however might have been classed otherwise for one was premature and the other a forceps delivery, but as neither had any convulsion until after the blow on the head, and the initial attack occurred in unquestionable relationship to the trauma, they

seem properly to belong here. A greater susceptibility to cerebral trauma may have existed however in these two cases.

Twenty-two of the children were perfectly well until the onset of meningitis or encephalitis, during the convalescence, or following the recovery from which epilepsy appeared. Six of these children were feeble minded and 6 were hemiplegic.

Five cases could be traced to an attack of pertussis, in two instances at the age of a few weeks, in one at sixteen months, and in two at two years. One was hemiplegic and one had strabismus. If these cases owe their origin to pertussis as seems probable, the damage to the brain was undoubtedly circulatory not toxic. In a somewhat different class are the next four cases which originated from infections, two during dysentery, the others following diphtheria and measles. It is somewhat difficult to determine the manner in which the cerebral trauma was caused. In one of the dysentery cases the severity of the symptoms indicate meningo-encephalitis, the 2½ year old child having lain for eight days unconscious, with retracted head. None of these children were spastic, one had deteriorated mentally since the measles, was under observation seven years, and finally committed to an institution.

In 53 cases no definite etiology could be determined. 23 presented evidence of cerebral defect other than the epilepsy, 14 feeble minded, (several showed cranial deformity) 7 hemiplegic, 1 paraplegic and 1 hydrocephalic. Thus a considerable number of these otherwise unexplained cases presented objective evidence of cerebral defect or deficiency, the result of trauma or disease.

The study of these 175 cases confirms an opinion I have held for many years, as the result of the observation of many hundred epileptic children, that heredity is a minor factor in the etiology of epilepsy, whenever the disease is studied at such an age that the true details of the past and family history of the victim can be obtained. These data are obtainable in the case of children to an infinitely greater extent than when the disease is investigated only in adults. Both the data and physical examination of epileptic children indicate that the affection in the majority of instances is the result of acquired cerebral injury from trauma or disease.

XIV.

Hemorrhage Following Tonsillectomy.

By F. E. Garland, M.D.,

and

D. Crosby Greene, M.D.

There is a wide variance of opinion among medical men in regard to the frequency of hemorrhage after tonsillectomy. Some men of large experience report but one or two cases of hemorrhage in a thousand cases operated upon. Others, who have done an equal amount of work put the number much higher,—one hemorrhage to very hundred, or even fifty, tonsil operations.

There are several ways of explaining this diversity of opinion. In the first place, those who operate mainly on adults, will have more bleeding cases than those whose work is confined chiefly to children. Secondly, what by one man would be considered an alarming bleeding, would be regarded by another operator as a necessary incident of the operation. Thirdly, hemorrhage cases are not by any means always fatal, and often escape the notice of the operator. He perhaps notes that the patient is very pale for several weeks following the operation, but the true cause is not suspected.

Why one case bleeds and another does not is a perplexing question. One thing is certain, however, and that is that the bleeding is not necessarily due to excessive trauma or careless cutting of the constrictor muscle. In practically all of the cases we have seen, which number about one hundred, the bleeding has occurred following easy operations where the tonsillar fossae and pillars of the palate remained entirely intact. A possible explanation, which we have been unable to verify, is this: there is often noted in the fossa after removing a tonsil, a plexus of small veins due possibly to chronic inflammation. It is possible to conceive of the knife or snare splitting open one of these veins longitudinally so that in the movements of the throat, the forming clot is continuously expelled from the remaining part of the vein, and bleeding is produced.

Be this as it may, it seems to us that the bleeding is more often venous than arterial. Small arteries which are seen pumping in a throat just after removing the tonsil, usually cease bleeding in a few minutes and do not require ligating.

The dangerous type of bleeding, the kind which goes on to exsanguination and death, may be described as an ooze. This continues for hours without giving any of the test-book symptoms of hemorrhage. The blood may be expelled by coughing, but the half-conscious patient more often swallows it. Accordingly, unless vomiting occurs, hemorrhage may continue without the slightest evidence. We have recently seen such a case in which the nurse, of more than average experience, did not detect bleeding until ten hours after operation. She noticed that the patient, a child, swallowed frequently, but not until a large quantity of blood was expelled from the stomach did she realize the danger.

This, then, is an alarming situation. If we wait for the marked symptoms of hemorrhage, our patient's condition is very serious, and we should occasionally have a fatality. Such a condition is absolutely unwarranted. Death from hemorrhage ought never to occur. We believe that safety from this danger lies in a careful

inspection of the patient's throat at intervals after operation. Although such inspection may not disclose the actual bleeding point, owing, in the first place to the obvious difficulties in the way of obtaining a good view of a semi-conscious patient's throat, and secondly, the fact that the bleeding may be low in the fossa and thus escape detection, there is one sign which is unfailing in these cases, and that is a clot which forms in the fossa above the bleeding point. This clot is always present, and its presence is sufficient evidence of bleeding. When removed it quickly reforms. This danger signal appears at the beginning of the bleeding, and not as most signs do, when death is near. By careful observation of the throat and an early detection of the clot, we are enabled to deal immediately with the situation. We do not wait for other signs, but at once reapply our ether, and suture the pillars. This process takes about three minutes, and as but little blood is lost, the patient's recovery proceeds in the usual manner.

XV.

POLIOMYELITIS. OPERATIVE TREATMENT.

BY ROBERT SOUTTER, M.D.

Most of the cases of poliomyelitis fortunately can be helped by simple means such as active and passive exercises and massage, muscle training, temporary braces, mechanical stretching etc. The many cases that require operation form but a small group when compared to the total number of cases treated by other methods. Where simple methods of treatment are not sufficient muscle and tendon transplantation are often of great value.

Nicolodoni was the first to introduce this method in the treatment of poliomyelitis. Since then many operations have been devised to supplant and improve muscle and tendon transference so that today the cripple can not only be relieved of his deformity but many useful operations have been originated and developed which aid in his locomotion.

The relief of deformity is important and must not be lost sight of. Operations for the increase of function should next be considered. These operations are applicable to all cases of misdirected muscular action, whether due to trauma, to cerebral paralysis, to paraplegia, to poliomyelitis or to congenital deformities. Some of these operations of temporary value are done to allow the weak or partially paralyzed muscle to regain its strength or to prevent deformity and contractures during the process. Skin flap and silk ligaments are operations of this class. The value of an operation in poliomyelitis may be better understood if we group the types of cases according to the paralysis remaining. Omiting those cases that recover completely from their temporary paralysis we have five classes; Those that may obtain a return of function by muscle training; those where a restoration of joint balance requires a redistribution of the muscles by a tendon or muscle transference; Those where the balance is so upset that a transference, while it may take up the lacking motion and lacking antagonism, is not sufficient to keep a lateral balance. In this type silk ligaments, astragaectomies, arthrodesis or other operations may be used. Again we have a class in which there are muscles not paralyzed but not of sufficient number or strength to allow a division and transfer. In this type the joint may be balanced by silk ligaments and the remaining muscles become useful in part or the whole of their arc of motion. Today even when the paralysis is complete about a joint much may be done by skin flap, periosteal flap, silk ligaments or some other plastic operation such as arthrodesis or in the case of an ankle, astragalectomy.

The material we work with in poliomyelitis is often so poor that it is really remarkable to get the results we do. The trophic disturbance is often such that healing and firm union of the soft tissues takes much longer; resistance to infection is less, the slightest pressure during healing affects the result, poor approximation of the tissues is paid for by very slow, granulating wounds, the latter may remain granulating for weeks and then heal, all the time inviting infection. While infection is not common, the most scrupulous care in detail is required of these cases and more precautions are necessary than in the usual operation. The incision should be as small and vertical as possible and made with care, both as to the manner of penetrating the skin layer and as to the direction of the vessels.

In the early years of transplantation there were many failures and some that seemed good at first later were not satisfactory. This was accounted for by the fact that a tendon to tendon transfer was the rule. The good tendon stretched out the weak insertion and the power of motion became lost. Tendinous insertion is preferable where it may be done. This method is advocated by Vulpius. Periosteal insertion obviates many of our difficulties. Since the introduction of silk as a tendon by Lange in 1902 this method of tendon elongation with its periosteal, sub-periosteal and even bone attachment has relieved the cause of many of the previous failures. The silk acts as a good tendon and about it a firm cylinder of fibrous tissue forms which re-enforces the silk and acts as a tendon in itself. There are few operations where technique is of more importance than in tendon or muscle transference and silk ligaments. The action of the muscles must be well understood and carefully tested; the operation

studied and laid out for each individual case, the line of pull made as direct as the desired motion requires. With care the belly of a muscle may be transferred some distance. The muscle selected should be strong. Weak, degenerated muscles ought not to be transferred as they simply bring discredit to a procedure that is good and helpful. The attachment should be firm, not likely to slip or pull out. The silk itself should be tested before use and in situ, the limb put in such a position and the transferred muscles so placed that there will be no slack to mar the results. Muscles too weak to take up fully the desired motion may be transferred exceptionally for locking a joint. For instance, the tranfer of two weak hamstrings, although not sufficiently strong to extend the lower leg, may be sufficient to lock the knee in walking and standing and allow a certain amount of flexion in sitting. Paralyzed muscles should not be used for this purpose on account of their almost endless tendency to stretch out. Beside the many and varied muscles that may be transferred the following muscles, when large and vigorous, give pretty uniform success when transplanted, the pronator-radii-teres. the flexors and extensors of the fingers, the hamstrings forward, the peronei, the sartorius, the long flexors and extensors of the toes, the tibialis posticus and anticus.

The opponents of the muscle to be transferred should be carefully considered and balanced. In other words, a small, weak, transferred muscle should not be expected to be of value when opposed to a strong, healthy group. Enough must be transferred to give good balance.

The tranfer is more successful when the lateral stability of the joint is maintained by good muscles or by natural or artificial ligaments. The individual not interested in mechanics to a minute degree should not transfer muscles or endeavor to place silk ligaments but once the technique of the operation is well mastered a prolonged study of the single strong muscle in various extensively paralyzed cases will help more toward successful transplantation than any one other thing.

Since the introduction of astragalectomy the lateral stability of the ankle joint can always be obtained without stiffening the joint. This gives us one of the most valuable operations known in the treatment of paralyzed ankle muscles. It also gives us a method of obtaining the lateral stability where a transplantation is desired but otherwise impossible on account of lateral weakness. The cripple must be given a limb on which he can trust his weight. Misdirected muscular activity may be advantageously corrected by transplantation, which gives the desired motion; more should be done if alone this does not give a stable limb well balanced for weight bearing. In a child the calculation should be made for the probable future weight, both from natural growth and lack of activity. Silk ligaments may be used early to maintain position of the joint, later to maintain antagonism to existing muscles that unopposed would contract and cause deformity and themselves become useless. They may be used as an aid to stability of the joints as in toe drop combined with a lateral lack of stability. They are also of use to stiffen the joint. These ligaments should not be used to prevent a varus or valgus due to bony deformity where the weight is over balanced and out of line nor where the varus or valgus is due to the strong contracture of muscles. Except in these instances with proper technique silk ligaments give the greatest satisfaction to the patient and surgeon. Wherever silk is used crescentic incisions should be made and care taken to have several layers of tissue overlapping the silk insertion, the latter being placed under the flap some distance from the line of incision.

The after care of these cases is quite as important as the consideration before operation. Motion may be encouraged early under observation but strain in the early weeks must be prevented for two months by plaster and for six or eight more by suitable braces. After this, braces are used that allow motion but limit its arc. Silk ligaments and muscle and tendon transplantations, followed by careful after treatment and muscle training give us a most effective means of aiding the extensively paralyzed and deformed cripple. We can correct deformity, make up for loss of function, maintain corrected contractures and displacements and overcome much of the atrophy and do away with many braces. In all the severe cases a benefit can be expected and in many of the light cases a practical restoration of functional usefulness.

XVI.

The Importance of the Early Recognition of Acute Arthritis of the Hip-Joint in Infants.

By Arthur T. Legg, M.D.

The recognition of the presence of an acute septic process in the hip-joint in infants would seem to give very little difficulty, but the number of cases seen in which the condition during the acute stage was not recognized, shows that the importance of its early recognition cannot be too strongly emphasized.

The condition, as is well known, follows any of the acute infectious diseases, such as pneumonia, measles and scarlet fever, intestinal autoinfection or from a septic process elsewhere, and starts as an infectious synovitis or an epiphysitis which breaks through into the joint; and, as

in all acute infections of the joints, is characterized by limitation of motion, tenderness, thickening of the joint, and fever, with high white count.

The great difficulty in the early diagnosis comes from the fact that infants unable to express themselves can show only in a general way the location of any trouble, and the general intoxication, especially at this age, is so great that the local condition is often entirely masked.

Cases in which the condition has not been recognized are usually brought for advice on account of a limp noticed when the child began to walk, with a history of having had an acute abscess of the upper thigh accompanied by more or less prostration and high temperature, when an infant, the condition at the time having been considered a superficial abscess of the soft parts, which was simply incised or allowed to rupture spontaneously.

Examination of these cases will show a limp identical to that of a congenital dislocation, with a half inch to an inch shortening of one leg, and a cicatrix of the upper thigh, usually about the trochanter, where the abscess pointed or was incised.

Roentgenological examination of these cases will show dislocation of the affected hip with absence of the head and a portion if not the entire neck of the femur, showing that during the acute process, the head and a portion of the neck were destroyed by the septic process, and the abscess breaking through the capsule allowed the remaining upper end of the femur to dislocate; the abscess, after rupturing the capsule, pointing in the upper thigh.

In those cases seen soon after the onset, a common history given is that the apparently well infant became suddenly irritable, cried constantly when bathed, and had considerable prostration and fever; or if the condition comes on more acutely, the first symptom noticed may be a convulsion followed by symptoms typical to an acute meningitis.

Given these histories and symptoms, it is quite natural that a local condition in the hip is not at first considered, and these general symptoms may continue to predominate the local symptoms for some days and a diagnosis of a beginning acute infectious disease or an anterior poliomyelitis is often made.

It is not until after careful watching and a very complete physical examination is made that the true condition is recognized; and even this at times is most difficult in an irritable infant where all attempts at examination are resisted.

The classical symptoms as already mentioned, of local tenderness, limitation of motion, and thickening of the joint, are often masked by the general condition of the infant. As regards local tenderness, the infant may seem to be in pain when any part of the affected leg is touched, and no one region can be made to show more tenderness than another. While the affected hip usually shows more or less limitation of motion from spasm, motions of the unaffected hip may be equally resisted. To palpate joint thickening is at times very difficult, especially in an infant where there is much fat about the pelvis; but this can generally be made out if both trochanters are grasped and a careful comparison of the thickness is made. In some cases, the recognition of this joint thickening is the only positive means of recognizing the condition except by the roentgenogram. Examination by this method will show in the very early cases a markedly dilated joint capsule, with the head of the femur usually thrown out to the brim of the acetabulum; or, in cases which have gone on for some time, the head will be seen free in the joint or entirely disintegrated.

Just how soon the head will be freed from the neck of the femur or entirely destroyed by the septic process depends upon the severity of the infection and the mode of invasion. That is, those infections starting at the epiphyseal line will free the head more readily than those starting as an infectious synovitis; but that it may be freed very early is evidenced by the fact that in one case operated upon by the writer, the head was found free in the joint four days after the onset.

It is on account, therefore, of this early separation of the head from the shaft, followed by destruction and dislocation, that the early recognition of this condition is of the greatest importance, that immediate surgical interference may be instituted; for early incision and evacuation of the pus in the joint will in many cases save the femoral head, or if the head has already been freed or destroyed, dislocation of the remaining neck, by maintaining it in its normal position, may be prevented.

XVII.

THE DIAGNOSIS OF ENLARGED THYMUS AND THE SYMPTOMATOLOGY OF HYPER-THYMATISM.

BY PHILIP H. SYLVESTER, M.D.

THE diagnosis of enlarged thymus lies in finding it. The greatest difficulty in its diagnosis lies in not being on the lookout for it. The following cases are illustrative:—

CASE 1. W. B. C. Male, 14 months old; only child of well parents.

Past History. Full term, normal delivery, breast fed for six months, then on various mixtures. Always did well but has had a lot of colds. Has had no serious diseases.

Present Illness. Child had been "choking to death" for ten minutes after a cent, with which it had been playing, had disappeared.

Physical Examination. Well developed and nourished child in rather urgent dyspnea, cyanotic, inspiration slow, retraction of interspaces, supraclavicular and sub-sternal, expiration difficult as well. Ten teeth in good condition. Tonsils a little large, not inflamed, no particular enlargement of adenoids. Epiglottis altogether too small to have admitted a cent. Lungs full of coarse râles, some piping. Expiration a little prolonged. Heart not enlarged, sounds regular, good quality, rather rapid. Spleen not enlarged. No superficial glandular enlargement. Examination not otherwise notable.

The dyspnea being evidently of tracheal origin and not so urgent as to demand intubation or tracheotomy, a Roentgen photograph was taken with the idea that the cent had probably lodged in the esophagus in such a way as to press on the trachea. A large thymus was shown, but no cent.

(Photograph.)

The cent was found under the corner of the rug. A more careful physical examination showed a shield-shaped area of dullness to threshold percussion just below the clavicles and continuous with that of the heart, approximately 4 cm. to the left of the median line and 3 cm. to the right.

The child's mother, on further questioning, stated that the child had been having bronchitis for three or four weeks, during which time it had "choked up" on several occasions.

The child's dyspnea became more urgent that evening and on the following day he was admitted to a local hospital, where he received six Roentgen treatments of five minutes each at intervals of one week. In the first two weeks he was intubed twice for collapse in dyspnea. He was discharged, well, with no lung, tracheal, or thymic signs at the end of eight weeks.

This case taught me two lessons that have been valuable since:

1. To think of thymus in cases of infantile dyspnea suggesting laryngeal stenosis or obstruction.
2. To take more pains with the history even when in a great hurry.

CASE 2. M. S. Female, 9 months, younger of two children. Parents well.

Past History. Full term, normal delivery, breast-fed for 5 months, then various mixtures; now getting about a 4.50—7—1.50—6 feedings 8 ounces. Is satisfied, never vomits. One movement is usually obtained daily by suppository or milk of magnesia; it is usually hard, brittle, very light colored and "smells very strong." The child has looked pasty since a short time after bottle feedings were begun.

Present Illness. Has been having bronchitis for six weeks, is better some days, worse others. Has had some rattling in chest all the time. Does not sit up much and does not try to talk. (Mother is also anxious about the teeth, as the persistence of the bronchitis has been ascribed by the family physician to teething.)

Physical Examination. A fairly developed, well nourished appearing but flabby child. Pasty color. Anterior fontanelle 1 inch by 1 inch, level. No teeth. Tonsils about the average, a little red. No snuffling or nasal obstruction. Ears negative. Lungs, good resonance throughout in back and front except that over upper portion of sternum and extending laterally is an area of dullness to threshold percussion 3½ cm. to the left of median line, 2½ cm. to right and connected by a fairly wide isthmus (vessels) with cardiac dullness below. Pressure on the inner ends of the clavicle, or over the manubrium causes an abnormal amount of tracheal compression. Lungs full of fine râles, mostly on expiration, which is prolonged as in ordinary asthma. Heart not enlarged, no murmurs, sounds good quality. Abdomen soft, contains a little more gas than usual. Liver not enlarged. Spleen not felt. No superficial glandular enlargement. Moderate rosary and slight enlargement of epiphyses of wrists and ankles. Physical examination otherwise not notable.

Diagnosis. Enlarged thymus, thymic asthma, rhachitis, fat over-feeding.

Subsequent History. Roentgenogram showed a shadow a trifle larger than the area of dullness, but corresponding so closely with it there could be no question as to the diagnosis.

The child received seven exposures of 5 minutes, at intervals of four days. After the fourth treatment I went away for two weeks and on my return the lungs were clear and there was no dullness other than that attributable to the large vessels. The mother stated that the child's breathing steadily improved after the second treatment. The child's appearance also improved greatly, but I am inclined to blame the correction of the food (to 2—6—2.50) for that as much as the involution of the thymus. There has been no recurrence of any symptoms referable to the thymus in two years.

CASE 3. Clara M. Female, 22 months, youngest of five children. Parents well. No recent contagious diseases.

Past History. Full term, normal delivery, breast fed for 2 days only, then various modifications. Always did well as far as digestion and nutrition are concerned, but has been a little slow in mental development. Had measles very lightly at 14 months. Seems cold most of the time and gets blue when exposed to cold. Has had asthma most of the time for about a year. Attacks last some times over three or four weeks, during which the child gets quite blue. Has never had any "choking spells." Is seldom free from asthma for more than a few days at a time. Has not had many colds.

Present Illness. Has been having asthma for about two weeks with less remission than usual. Has become obviously tired. At times pulls on a chair or bed clothes to get her breath. Is losing weight. Has no appetite. Has not seemed feverish.

Physical Examination. Well developed, fairly nourished. Skin shows many fine wrinkles. Anterior fontanelle closed. Ears negative. Child in rather urgent asthma with prolonged expiration accompanied by wheezing. Twelve teeth. Tongue clear. Tonsils small, ragged, not inflamed; no apparent adenoid enlargement. Lungs, good resonance everywhere except that over upper sternum is an area of dullness to threshold percussion about the shape of the palm of the hand, extending 3 cm. to the right of mid-sternum and 3½ cm. to the left,

and about 5 cm. down, distinctly separated from the cardiac dullness. No D'Espigne's sign. Lungs everywhere full of bubbling râles on inspiration, which is short and gasping, and of piping as well as of bubbling râles during expiration, which is much prolonged. Heart not enlarged; action very rapid, no murmurs made out, quality good. Abdomen examination difficult as child refuses to relax. No enlargement of liver or spleen to percussion. No superficial glandular enlargement. Examination otherwise not notable.

Diagnosis. Thymic asthma.

Roentgenograph showed shadow about as on percussion, but apparently a little larger.

Child received five daily treatments of five minutes, then three of five minutes at intervals of four days. Was distinctly worse after first treatment, but began to improve after the second and continued to improve until the fifth treatment, when the asthma completely cleared up. Has had no further symptoms for nine months. Two weeks after the last treatment no thymus was noted by percussion. No plate was made at the last treatment, and the first plate is not now available for this paper.

CASE 4. T. T. Male, 19 months, only child, no miscarriages. Parents well.

Past History. "Eight months' baby," birth weight, 8 pounds. Breast fed for nine months, then whole milk and infant diet. Has had frequent colds. Tonsillitis several times. Otitis media on both sides at one year. Has looked pasty for about a year and does not seem as lively and bright as other children of same age in the neighborhood.

Present Illness. Cough and cold for about two weeks. Parents wish to have determined the cause of child's poor appearance; think his diet ought to be regulated.

Physical Examination. Well developed and nourished. Color, bluish white as in excessive fat feeding. (Later examination of stools showed nothing abnormal.) Anterior fontanelle admits tip of finger. Tongue clean. Throat red. Tonsils large and ragged, not inflamed. Pharyngeal wall studded with "warts." Adenoid visible when palate is raised. Ear drums wrinkled. No light reflex, no retraction, no fluid. Ten teeth. Lungs, uniformly good resonance except over sternum where to threshold percussion is a fat sausage-shaped area of dullness extending from mid-sternum to 4 cm. on the left and 3 cm. on the right, joining the cardiac dullness below. On crying, during expiration, a soft mass impinges on a finger tip hooked into supra-sternal notch. Inspiration short and easy; expiration prolonged with many râles just short of wheezing. Heart not enlarged, upper border not made out on account of thymic dullness. Sounds clear, no murmurs. Abdomen soft. Lower edge of liver just felt. Spleen 2 cm. below costal border, no notch felt. Genitals, phimosis, testicles undescended. Glands, lentil size in axillae, neck, and groins. Glands on right side of neck are larger than the rest, presumably due to infected tonsils. No abnormality of nervous reactions. Blood and urine not examined.

Diagnosis. Status lymphaticus; +thymic asthma seemed here unquestionable.

Unfortunately there was no Roentgen-ray apparatus within twenty miles, and the parents refused to send the child to the Children's Hospital for Roentgen diagnosis and treatment, in spite of my warnings as to the dangers of the condition. Six months later I learned that the child died without apparent cause while playing in his sand pile, previous to which he had coughed and wheezed a great deal.

CASE 5. E. T. Female. Five months old, youngest of three children. Family well. No contagious diseases.

Past History. Full term, normal delivery. Birth weight, 9¼ pounds. Is breast fed. Has had no digestive disturbance except for difficulty in nursing owing to the rapid breathing. Has gained slowly but consistently. Tends to be constipated; has always "breathed hard."

Present Illness. Comes for examination. Mother thinks child has growth in throat which has caused this hard breathing since birth. When nursing, the child cannot breathe through the nose, but sucks once or twice, then gasps for breath, breathes rapidly three or four times, then sucks once or twice, and so on. Has never been blue, but has wheezed of late.

Physical Examination. Well developed and nourished. Weight, 14 pounds, 4 ounces. Breathes quietly when undisturbed, but with distinctly more expiratory sound than is usually heard. When handled or disturbed breathes much more rapidly and noisily, especially during expiration. No wheeze noted. Anterior fontanelle three-fourths by one-half inch, level. Ears negative. No teeth. Throat not red. Tonsils not unusually large. Small adenoid felt. (No obstruction.) Lungs, good resonance throughout except in region of upper sternum, where there is a shield-shaped area of dullness to percussion (ordinary) extending 3 cm. to the right of mid-sternum and 2½ to left, and continuing down into area of cardiac dullness.

Pressure over supra-sternal notch and over manubrium increases the harsh sound of breathing. Lungs have few râles. Expiration is harsh, prolonged and high pitched with coarse moist râles, no piping râles and no wheezing, but type of breathing is asthmatic without the wheeze. Heart not enlarged. Sounds rapid, good quality, no murmurs. Abdomen, liver edge just felt. Spleen not felt. No general superficial glandular enlargement. Genitals negative. Physical examination otherwise not notable.

Roentgenogram showed enlarged thymus corresponding closely to area of dullness but more rectangular, relations pretty much the same.

Subsequent History. Received four exposures of 5 minutes on succeeding days. Seemed much worse after the first treatment, but symptoms were practically clear after the fourth exposure. Two weeks later no enlargement could be made out by threshold percussion. Child remained free of symptoms and gained well for four months, when breathing became again asthmatic in type, but not bad. Parents then, without consulting me, had given three treatments of 10 minutes each, three days apart. Two weeks after that I saw the child during a slight digestive upset and could find no trace of thymus or suggestion of asthmatic breathing. The child has remained well since.

The following case kindly reported to me by a colleague I add as an illustration of how easy it is to overlook an enlarged thymus, probably because we do not think of it, in the presence of dyspnea with symptoms of tracheal stenosis, and (as we usually do) make a diagnosis of laryngeal diphtheria. In this case an early diagnosis and Roentgen ray treatment might have saved the child.

Case 6. C. L. Male, 3 years, American.

Family History and Past History. Negative.

Present Illness. Past two weeks abscess in left cervical region; abscess opened by doctor and child getting well. Seen this evening at 6 p.m. and child had a hearty supper, seemed perfectly well and happy. At 7 p.m. child vomited and began to breathe hard and exude froth from mouth. About 9 p.m. child became worse, breathing very difficult. At 11 p.m. child seen by doctor and sent to diphtheria ward of hospital with diagnosis of laryngeal diphtheria. Admitted to ward at 12, midnight.

Physical Examination. A well developed and nourished child, quiet and apathetic, preferring to lie on the side; somewhat cyanotic; breathing labored with gurgling noise on respiration, no crowing sound. Child talks clearly. Marked retraction, on inspiration, of the intercostal and supraclavicular spaces. Reflexes normal. Pupils equal and react. Skin clear. Slight enlargement of the cervical glands. Discharging sinus on left side of neck just below the tip of the mastoid. Throat shows a large pair of tonsils. Large amount of bloody foam comes up the pharynx on smallest instigation. No membrane.

Heart very rapid, sounds weak and stopping. Apex unable to make out. P_2 greater than A_2. No murmurs. Pulse rapid, easily compressible.

Lungs, dullness at both bases with diminished breathing, above the dullness there are coarse, bubbling râles.

Abdomen, liver large, 3 cm. below costal margin. Spleen not felt. Soft, tympanitic. Temperature 99(?). Respirations 50, pulse(?). Antitoxin ordered, 12,000.

Patient had just received an initial dose of antitoxin of 4000 units when he stopped breathing without warning. Artificial respiration done at once and 1-40 gr. strychnia s.c. given, but without avail. The child proceeded to throw out a lot of mucus from mouth and bloody fluid from nostrils and after three inspirations at long intervals, the child died, the heart having stopped long before the breathing at 12.45.

Autopsy performed the next day shows the following salient points:

1. Excessive free yellow fluid in both pleural cavities.

2. Both lungs congested, dark, and hard to the feel. On section it exudes bloody fluid and froth. Peribronchial and root of lungs lymph nodes much hypertrophied.

3. Heart normal.

4. Thymus large, extending from thyroid cartilage down along and covering the deep structures of the neck; both lobes completely cover both auricles of heart, the length and width of the thymus gland being approximately 12 x 5 respectively.

5. Liver larger than ordinary size, dark and congested. On cut section shows markings obliterated by much fluid, very edematous. Gall bladder large, engorged with gall.

6. Spleen good size, also dark and congested.

Perhaps I ought to describe what I speak of as "threshold percussion" in the above cases. It is performed as follows: The mother, or the nurse, sits in a chair backed up into a corner of a small, quiet room (the bathroom serves very well), holding the child in her lap, the child's head hanging over either thigh. The physician starts percussion well out on the chest with such light strokes that when the ear is within a few inches of the area under percussion only the faintest possible resonance is heard. As the finger is moved care is taken to keep the percussion stroke uniform. When sound disappears dullness begins. Unless done in a quiet room and upon a quiet child this method is valueless. I have found it particularly satisfactory in determining the right border of the heart in small children.

The above cases are too few to admit of any hard and fast conclusions, nevertheless it seems fair to assum that—

1. We should be more on the lookout for enlarged thymus in cases of asthma, persistent bronchitis, and laryngeal or tracheal stenosis.

2. Inasmuch as the percussion outlines corresponded so closely with those shown by the Roentgenograms, the enlarged thymus should be found on examination by the ordinary methods of physical diagnosis, of which threshold percussion is apparently accurate and satisfactory in the hands of one familiar with children.

3. Children showing enlarged thymus present two fairly uniform sets of respiratory symptoms:

a. Those due to pressure on the trachea, as shown by cyanosis, slow, labored breathing and supra-clavicular and sub-sternum retraction.

b. Those presumably due to toxemia or hyper-secretion of the thymus, namely, breathing of the asthmatic type characterized by fairly easy inspiration and long, difficult expiration, accompanied by râles.

4. Inasmuch as in all the cases treated the symptoms for which treatment was instituted disappeared when the physical evidences of enlarged thymus disappeared, there is a causal relationship between—

a. The enlarged thymus and the pressure symptoms.

b. The enlarged thymus and the asthmatic symptoms which were obviously not due to pressure, therefore probably due to hyper-secretion.

5. Pressure symptoms and toxic symptoms may be combined in the same case, but those of the toxic type are more constant.

XVIII.

THE TREATMENT OF CERVICAL ADENITIS IN CHILDREN.

BY W. E. LADD, M.D.

AT the present time there is no uniform method of treatment of tubercular vervical adenitis adopted by the profession at large. I am writing this paper with the hope that by provoking discussion and adding my experience to that of others we may help to establish more uniformity of treatment of this disease in the future.

The methods of treatment which demand our attention at present are: Open air and hygiene alone, hygiene combined with tuberculin and palliative surgery, with X-ray therapy, with heliotherapy, with palliative surgery and with radical surgery. It will be seen that in this list of treatments, hygiene by which is meant open air, nourishing food, etc., is agreed to almost universally, and there are undoubtedly a certain number of patients who get well under this form of treatment alone. But they will not all recover under this therapy and we must consider what form of treatment added to hygiene will give us the best results.

The merits of tuberculin combined with palliative surgery, by which is meant the opening and drainage of abscesses as they occur, has been talked of a good deal during the last few years and recommended by many. Among quite a large number of cases that I have seen during the past five or six years I have been able to observe several patients treated in this way for varying lengths of time. I have always been disappointed in the results and the persistence of sinuses and the continued necessity of frequent dressings. Nor has the improvement in general condition of the patient ever been very striking to me. Of course the patients that I have seen under tuberculin treatment are only those requiring surgical care so that I may get a false impression of its efficacy. However in reviewing an article written in January, 1912, by John B. Hawes, 2nd, who is certainly an ardent advocate of tuberculin and hygiene, I find he reports twenty-one cases of tubercular cervical adenitis in children with ten apparent cures after treatment averaging eleven months in duration. He includes in his apparent cures patients in whom most of the glands disappear and whose general condition has improved. Also I note that in these apparent cures, three patients had a few small glands and two had one broken down gland. It has been my experience that such cases usually get well with treatment of the portal of entry and hygiene and incision and drainage of the single broken down gland. But even if he has made ten cures by his system of treatment, out of twenty-one patients who would not have got well otherwise that is an average of less than 50%. With this small percentage in favorable cases the position of advocating such treatment in place of good surgery appears to me untenable as I shall try to show later. These results of Dr. Hawes have interested me particularly because he is dealing with presumably about the same class of patient that we see at the Children's Hospital and in the same climate and also because I have confidence in his knowledge of the tuberculin treatment.

With X-ray therapy my experience has been limited. I have never seen a case of extensive adenitis cured by this means. It seems to me that the principle upon which it is based is irrational: namely the stimulation of periglandular tissue which prevents the gland from breaking down, encroaches on it and eventually causes its calcification. It seems to me more logical to remove the tubercular glands than to shut them up within the body. In superficial broken down glands that are slow to heal I have occasionally found the X-ray of great value, three or four exposures sufficing to cause healing. Likewise a few treatments with the X-ray will sometimes cause healing of a sinus and make possible a clean dissection of the underlying glands. In the few cases in which I have done this though the dissection has been clean it has been difficult on account of the denseness of the periglandular connective tissue. My observations on X-ray therapy though limited have coincided more or less closely in the cases with superficial infections with those of men who have used this form of treatment extensively. Thus Tousey[2] states that the Roentgen ray hastens the healing of sinuses and of tubercular abscesses which have been opened. Iselin[3] considers extirpation of tubercular glands the best form of treatment when the glands are not broken down; when they are, however, he feels that he has had very good results with the X-ray in over two hundred cases.

Heliotherapy has its advocates and apparently has yielded many good results, but is available only for those patients in this community who have sufficient means to enable them to go to high altitudes. That is the value of the sun's rays as a direct therapeutic agent is largely lost at sea level.

With palliative surgery I regret to state, owing to force of circumstances, I have had more experience than with any other form of treatment. The cases which get well under this treatment are those with single superficial broken down glands and these sometimes promptly and sometimes only after long periods of time with comparatively frequent dressings irksome to both the surgeon and the patient. In patients who have more than one gland involved which is of course far more commonly the case, palliative surgery has nothing to recommend it so far as I have ever been able to observe. In

* Read at the annual meeting of the New England Pediatric Society, December 12, 1913.

such cases the most superficial gland breaks down first, this is opened and about the time it begins to heal the next gland deeper in becomes fluctuant and requires incision. This succession of events continues until all the glands have broken down and been drained. Though the patient may eventually recover it is only after a period of months or even years and then with a neck presenting numerous and extremely unsightly and irregular scars.

What is the logical treatment for tuberculous infection of the cervical lymph nodes? We know from animal experimentation and perhaps more forcibly from the clever clinical experiments of Goodale[4], who injected coloring matter into the crypts of the tonsil and recovered it in the cervical glands, that we have to do with a descending infection. This infection has for its common portal of entry the tonsil, though we know from the experiments and observations of Stark[5] and Cornet that carious teeth may be the site of the primary focus. From other observers we find that the adenoid, the ear and the nose may though more rarely be guilty of harboring the primary infection. With these numerous sites through which the tubercle bacilli may gain entrance to the cervical glands it is not always easy to find which one is the portal of entry, but our knowledge of the distribution of lymph vessels makes it possible to avoid making many mistakes. Thus we know, for example, that the glands under the angle of the jaw drain the tonsil, the submental group the teeth and the anterior chamber of the nose etc.

Fortunately the glands most commonly infected are those in the superior carotid triangle under the angle of the jaw, and these are the glands which drain the tonsil. In these cases the tonsils should always be removed regardless of their appearance. I was surprised to find in an article by Judd[6] reporting several hundred cases from the Mayo clinic that he was able to trace the portal of entry in very few cases. He found that less than one per cent. of the tonsils examined had tubercular lesions. In my own series of forty dissections of the neck I have had the tonsils examined in sixteen cases. I am indebted to Dr. H. W. Karsner of the Pathological department of the Harvard Medical School for examining these with much care and for his report which now follows.

Histologically, unquestionable tuberculosis was found in ten of the 16 cases examined, or in 62.5%.

Grossly, the tuberculous tonsils with one exception failed to show any evidence of tuberculosis; the one exception (H. 13-233) showing in cross section numerous small yellow apparently necrotic areas, but nothing on the outer surface. The tubercles found histologically in this case were very distinctly caseous. Throughout the series the tubercles were either miliary or very small conglomerations, three cases showing no noticeable caseation, five only very slight caseation and two well marked caseation. Of the last, as indicated, one was sufficiently marked to be seen grossly in cross section, the other was not noticeable to the naked eye. The number of tubercles was either great or small, the tonsils being divided in this respect, five showing only a small number, five a great number. This point is of little significance for the results represent the picture as seen in only a few slides of each case; serial section might easily have produced a different picture. The same source of error is found in an attempt to group the cases according to situation of the lesions. From the examination of the slides, however, it was found that four cases showed a deep situation of the tubercles, *i.e.*, near the deep capsule, three showed a distinctly superficial position, *i. e.*, near the surface epithelium, and three cases showed wide spread diffusion of the tubercles. Giant cells, for the most part were frequent and typical, although in three cases they were in relatively small numbers, but, nevertheless, quite typical in morphology. The following table indicates the results:—

TABLE I.

FINDINGS IN REFERENCE TO TUBERCULOSIS.

	Position of Tubercles.			Number.		Giant Cells.		Caseation.*	Gross Evidence
Case.	Deep.	Superficial.	Widespread.	Few.	Many.	Few.	Many.		of Tuberculosis
11-1230			+		+		+	+	—
12-20		+		+			+	—	—
12-829			+		+	+		—	—
12-913		+		+			+	V. S.	—
13-103	+			+			+	V. S.	—
13-233	+				+		+	+	+
13-147	+			+		+		—	—
13-250		+			+		+	V. S.	—
13-289	+			+		+		V. S.	—
13-399			+		+		+	V. S.	—

* V. S. indicates a very small amount of caseation, — indicates a practically negligible amount of caseation, and + indicates well-marked caseation.

The tuberculous tonsils showed pathological changes in addition to the presence of the tuberculosis. Histologically, there was well marked retention in the crypts in four cases, slight retention in four cases and practically normal crypts in two cases. The follicles, particularly

germinal centres, showed slight hyperplasia in six cases, marked hyperplasia in two cases and were normal in three cases. There was moderate or well marked hyperplasia of the connective tissue in four cases, slight hyperplasia in two cases and a normal connective tissue in four cases. A review of the following table will show that of the ten cases, only one was normal aside from its tuberculous condition (13-399), two were only slightly diseased (13-829, 13-233) and the rest would have been considered distinctly pathological tonsils even had there been no tuberculosis present. Of the three only slightly diseased generally, two (13-399, 13-829) showed wide-spread tuberculosis and the third very well marked tuberculous involvement. It can not be said that there is any parallel between the degree of tuberculosis and accessory involvement. The table follows:—

TABLE II.

NON-TUBERCULOUS CHANGES IN TUBERCULOUS TONSILS.

Case.	Consistence.	Follicular Hyperplasia.	Retention in Crypts.	Connective Tissue Hyperplasia
11-1230	Soft	Slight	Slight	Moderate
12-20	Soft	Slight	Marked	Moderate
13-829	Firm	—	—	Slight
12-913	Normal	—	Slight	Slight
13-103	Soft	Marked	Moderate	—
13-233	Soft	Slight	Slight	—
13-147	Soft	Slight	Marked	Well marked
13-250	Normal	Slight	Marked	—
13-289	Normal	Slight	Slight	Well marked
13-399	Normal	—	—	—

The so-called non-tuberculous cases include those in which the few sections made failed to demonstrate histological tubercles. It is possible that serial sections might have shown tubercles and it is further possible that injections into guinea-pigs might have revealed the presence of tubercle bacilli in the tonsils. Of these cases, however, only one showed tonsils that were normal. The others showed various alterations, which singly or collectively stamped the organs as pathological. These changes are indicated in the following table. One case (13-193) was thought on gross examination to be tuberculous because the cross section of the enlarged organ showed numerous small yellow neurotic areas, but histologically these were found to be markedly distended and cystic crypts. The table follows:

TABLE III.

HISTOLOGICALLY NON-TUBERCULOUS TONSILS.

Case.	Consistence.	Follicular Hyperplasia.	Retention in Crypts.	Connective Tissue Hyperplasia
12-451	No Note	—	—	—
12-570	" "	Moderate	—	Marked
12-60	" "	Marked	Marked	Marked
13-135	" "	Moderate	Marked	—
13-215	" "	Moderate	Marked	Moderate
13-193	" "	Slight	Very marked	Slight

To summarize, it may be said that of the sixteen cases studied, only one (12-451) presented normal tonsils. Of five others, which were tuberculous, four showed sufficient retention of necrotic material in the crypts to regard them as seriously diseased tonsils. Of the ten tuberculous tonsils, all were regarded as seriously diseased because of the presence of tuberculosis and of these, seven were sufficiently diseased otherwise to justify removal.

The gross examination of the tuberculous tonsils showed nothing characteristic except in one case and the gross appearance of this case (13-233) was not sufficiently distinctive to differentiate it grossly from the appearance of a non-tuberculous tonsil (13-193) in which distention of the crypts produced yellow caseous areas in the cross section.

The tuberculous process in the involved tonsils was active and in no case was there found any attempt at encapsulation, although in two cases (12-829, 13-147) the large number of epithelioid cells and almost complete absence of necrosis gave rise to the belief that the tubercles were growing in a somewhat resistant tissue.

As far as can be concluded from the limited number of cases studied, 62.5% of cases of tuberculous cervical lymphadenitis show active tuberculosis of the tonsils. Of the remaining 37.5%, or six cases, five, or 83.3% of the non-tuberculous cases, showed pathological alteration, sufficient to justify removal, especially when it is considered that the presence of a low grade chronic inflammation may favor infection. Hence, had these tonsils remained they might have been a serious menace to the patient because of the danger of subsequent infection by a variety of organisms, including the tubercle bacillus. That these patients might be consid-

ered immune to tuberculous infection because of the attack of tuberculous cervical lymphadenitis, successfully combated by surgical removal, is not borne out by immunological studies of the disease.

These findings bring out two facts very clearly to my mind. First that there are many tubercular tonsils, which can not be diagnosed by inspection of the throat, and consequently the recommendation we hear so often made that in cases of cervical adenitis the throat be only examined is not to be commended. The tonsils should be removed as a matter of routine. Second that if anyone is still so misguided as to recommend a guillotine operation without the removal of the capsule he will probably leave the primary focus of tuberculosis in the throat. It will be seen from these facts that the first step in the treatment is the removal of the primary focus. After this has been done the question arises of how extensive a dissection of the neck is required. I feel that there has been a good deal of misunderstanding by the use of the term radical. A radical operation in the neck means to many physicians an enormous incision extending from the tip of the mastoid down to the middle of the clavicle and across to the sternal notch with the removal of all glands and gland-bearing structures underneath. I have seen such dissections dexterously performed without the removal of the tonsils followed by recurrence of the glands within three months. I do not consider such an operation radical in the true sense of the word which really means the destruction of the disease with its root. Any operation which omits the primary focus is not radical no matter how extensive. A radical operation can be performed through a small incision leaving an inconspicuous scar in the majority of cases. The incision of choice is a transverse one made in one of the natural creases of the neck as recommended by Dowd[7]. Through such an incision the whole of the superior carotid triangle can be reached easily and a part of the inferior and occipital triangles. Where the glandular involvement is very extensive the large incision is essential. This however is not very often required.

With a logical operation what results can we offer the sufferers of this form of tuberculosis? Dowd reports statistics on two hundred and seventy-five cases of which number fifty-four observed for from five to thirteen and a half years 98% were apparently cured. Forty-two observed for from three to five years 88% apparently cured. Eighty-seven patients observed for from one to three years 83.8% apparently cured. Ninety-two patients observed less than one year 85.8% were apparently cured. Of the total two hundred and seventy-five patients approximately 88% were apparently cured. He reports one death from a secondary hemorrhage from the internal jugular vein. Judd reports six hundred and forty-nine cases without any direct mortality but with one patient dying a few weeks after operation from general tuberculosis and one three months later from diffuse sepsis. Mitchell[8] reports similiar good results.

In my own small series of forty cases one patient died a few days after operation with symptoms suggesting meningitis. Of the remaining thirty-nine, thirty have been followed for periods of time from three months to two years. The other nine have been operated on too recently to suggest the probability of their cure. Of the thirty patients followed twenty-five are apparently cured by which I mean they show no signs of recurrence, no palpable glands and are in good general condition. These patients as a rule have improved very promptly in their general condition following operation. That is in a matter of about three weeks they begin to have a better appetite, put on flesh and improve in color, and do not need medical attention other than instructions about their mode of living. Of the other five not apparently cured, one shows no palpable glands but is in poor general condition though no site of disease has been discovered. Two patients had recurrences on the opposite side of the neck; one has a few small glands along the posterior border of the sterno-mastoid muscle, one has a small swelling in the scar. This gives in my series approximately 83% of apparent cures. I expect that some of these patients who are apparently cured now may have recurrences later and I expect to cure some permanently who now have recurrences so that the average will not be altered much. Of this series of cases of mine, only eleven have been operated on at a favorable time for operation, by which I mean before the glands had broken down or before sinuses had occurred. Of these eleven all the wounds healed by first intention. Nine have no recurrence. One has a few small glands along the posterior border of the sterno-mastoid and one has not had time to have recurrence.

With these facts in view I feel justified in drawing the following conclusions. That thorough extirpation of all infected glands with the primary focus yields by far the highest percentage of cures of any form of treatment yet devised.

That active tuberculosis of the tonsils in cases with cervical adenitis is probably far more common than has been supposed.

That to accomplish a cure by radical surgery requires far less time than by other means. This I believe to be a point of practical importance for although a child's time may be of small value, the time of the parent who brings the child may be of considerable value. To advocate the head of a family losing half a day a week for six months or more should be avoided when possible.

That to avoid unsightly scars and to insure first intention wounds the patients should be

operated on early before the glands have broken down.

That hygiene has a very important place in the after treatment and that the surgeon needs the cooperation of his medical brethren to help carry this out and to refer cases early.

The small size of the Children's Hospital has handicapped us considerably in the past by preventing our taking cases in promptly when the patients are in a favorable condition for operation. I hope that the new hospital will remedy this situation in part and I expect two years from now to report far better results than at present.

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XIX.

A CASE OF LYMPH CYST OF THE MESENTERY.

BY CHARLES G. MIXTER, M. D.

The rarity with which cysts of the mesentery are met with at operation and the scarcity of accurate reports in the literature, with a careful analysis of the contents of the cyst and a microscopic examination of its wall, indicate the importance of reporting individual cases of this disease.

CATHERINE DONOVAN. Age, 4½ years. Jan 15, 1913.

Complaint. Swelling of abdomen for one month.

Family History. Father died three years ago of apoplexy. Mother and four brothers living and well.

Past History. Full term, normal delivery, breast fed 9 months. No known exposure to tuberculosis. Measles at one year. Otherwise well. Appetite good, bowels normal.

Present Illness. Three weeks ago mother noticed that abdomen was swollen and patient complained of discomfort. Given castor oil and diet was restricted without relief. Patient began to lose appetite. Child did not want to play. Abdomen gradually increased in size. No fever, no cough, no night sweats, no edema of face or legs, no vomiting or headache.

Personal Examination. Fairly developed and nourished girl, showing considerable loss of weight and pallor, breathing somewhat shallow. No glandular enlargement. Reflexes normal. Tonsils hypertrophied. Heart normal with the exception of somewhat rapid pulse, 110. Lungs showed signs of compressions at both bases, with slight dullness and with a few moist râles. Abdomen, tremendously large, symmetrical, dull throughout except for a small tympanitic area in epigastrium; 72 cm. in greatest circumference. No masses felt. Superficial abdominal veins distended. Blood examination: Hgb. 85%, white count 14,000. Von Pirquet reaction negative. Urine negative.

In spite of the fact that the Von Pirquet reaction was negative, a diagnosis of tubercular peritonitis was made and operation advised.

ETHER OPERATION.

Jan. 18, 1913. Two-inch right rectus incision near median line, peritoneal cavity opened with the escape of a small amount of free, straw colored, slightly cloudy fluid. The peritoneum was not thickened, no tubercles seen. On exploration of the abdomen a large, very thin walled, non-adherent lobulated cyst was found extending from the pelvis to the ensiform and filling the whole of the abdominal cavity. As the point of origin of the cyst could not be found on account of its size, the cyst was tapped and the greater portion of the fluid was withdrawn. Three quarts of fluid were saved, another quart or more being lost. Fluid was greenish yellow with a large amount of flocculent material and a number of clots which appeared to be fibrin, greenish yellow in color, the largest being the size of an English walnut. The wound was then enlarged and the cyst wall delivered, and it was found to arise from the mesentery beneath the first portion of the jejunum. The cyst grew laterally from either side of the mesentery and formed three lobes, two on the superior side of the mesentery and one on the inferior, the latter being the larger. The lobes of the cyst when distended with fluid lay closely approximated and the loop of jejunum beneath which the tumor arose, lay flattened out at the bottom of the sulcus. The intestine lay directly on the cyst wall, from which it could not be separated, and the only method deemed advisable was resection of the overlying loop of jejunum. Intestinal clamps were placed on the intestine on either side of the cyst, the mesentery beneath and on either side of the cyst was tied off in sections, and the cyst together with about eight inches of the adherent jejunum, was resected. A lateral anastamosis was done between the proximal and distal ends of the jejunum. The V-shaped gap in the mesentery was closed with catgut. A num-

* Read at the meeting of the New England Pediatric Society.

ber of enlarged glands were found in the mesentery, one of which was excised for microscopical examination. The abdominal wound was closed in layers without drainage and the child was put to bed in fair condition.

The patient recovered well from the operation but for six days was unable to retain any nourishment. Small amounts of liquids given by mouth might be retained for a number of hours and then the whole amount of nourishment given would be vomited in an explosive manner. No relief was obtained from gastric lavage. Bile was noticed in the vomitus. During this time she was given nutrient enemata every three hours, consisting of three ounces of peptonized milk and one dram of brandy, which were retained and absorbed remarkably well. X-rays were taken of bismuth given by stomach tube, and a dilated stomach and duodenum was found, with an apparently complete obstruction at the lower end of the duodenum, no food passing this point 48 hours after the meal was given. The temperature remained nearly normal. The pulse ranged about 90 until the fifth day after operation, when it rose to 120 and became intermittent. On Jan. 24 a further operation was deemed necessary to relieve the obstruction at the lateral anastomosis.

ETHER OPERATION.

Jan 24. Four-inch left rectus incision near the median line from the costal margin downward was made. No free fluid or indication of peritonitis was found. The omentum and transverse colon were lifted up, after freeing a small tag from the first operative wound. On investigation, the small intestine was found to have been rotated on its mesentery so that the body of the small intestine was found to lie chiefly in the upper right quadrant of the abdomen with a torsion of the mesentery to the right. The iliocecal valve was found on the left side of the abdomen just below the umbilicus. The pull on the superior vessels of the mesentery was sufficient to cause considerable obstruction to the circulation and tension on the anastomosis which had been made at the previous operation. The intestine at this point was thickened, plum colored, and the sitches, which had so far held without leakage, were beginning to pull through the coats of the intestine and on manipulation of the anastomosis the sutures gave way, leaving a large opening into the lumen of the intestine. The anastomosis was protected with gauze and the small intestine replaced in its normal position. An attempt was made to close the wound in the anastomosis but the stitches tore through the friable intestinal coats. Clamps were then applied, and the anastomosis and about one inch of intestine on either side was resected and an end-to-end anastomosis done, as it was found that the upper end of the jejunum was too short to permit of a lateral. As there was some doubt of the patency of the opening on account of the infolding of a large amount of tissue at the point of anastomosis, the small intestine was opened below the point of suture and a half length forceps passed upward through the anastomosis, which was found to be patent. The opening in the intestinal wall was then closed. The intestine in the region of the union was of normal color, showing that the circulation was no longer impeded. The abdominal wound was then closed in layers, without drainage.

Following operation there was some vomiting for four days, but at no time did the quantity of vomitus equal the total of liquids ingested. Bile no longer appeared in the vomitus. Nutrient enemata were continued at increasing intervals for one week, at which time they were omitted. Soft solid diet was given at the end of a week. House diet with care after the tenth day. There was some superficial suppuration in both wounds. A series of bismuth x-rays were taken three and one-half weeks after the second operation and showed the bismuth remaining in the stomach for an abnormally long time, apparently due to spasm at the pylorus, as there was none in the duodenum after nine and one-half hours. The bismuth was then expelled rapidly from the stomach and met with no obstruction in the small intestine. The patient made a rapid convalescence with steady increase in weight and was discharged to Wellesley convalescent home, Feb. 19.

She remained at Wellesley until April 9, and during this time only vomited once, on March 14, a small amount of thin yellowish fluid. Her weight increased from 27 pounds on March 7 to 35 pounds on April 9.

On Jan. 10, 1914, a report received from the mother of the child states that the patient is in excellent general health, has gained normally in weight and plays actively with other children; no digestive disturbances or trouble with the bowels were mentioned.

The following pathological report was made by Dr. W. F. Whitney, Harvard Medical School.

The specimen consisted of a cyst from the mesentery. It contained a large amount of fluid of a slightly yellowish opalescent color, specific gravity 1017, with spontaneous coagulum of fibrin.

Microscopical examination showed an occasional round cell. The wall was smooth externally, and internally it was trabeculated and smooth. The cyst was divided by an adherent piece of intestine into an hour-glass shaped sac, the two parts communicating by a small opening.

Microscopic examination showed in the wall numerous dilated passages, some with a fibrinous coagulum and others empty. The wall was composed of fibrous tissues, here and there with a little fat and lymphoid tissue interspersed.

The points of especial interest in this case were: First—the rapid increase in size of the cyst to its really enormous proportions; second—the absence of symptoms with the exception of those of pressure upward upon the diaphram; third—the transposition of the small intestine which had apparently been caused by the downward growth of the large inferior lobe of the cyst causing a torsion of the mesentery and rotation of the small intestine pulling the cecum across to the left side of the abdomen.

Mesenteric cysts were first noted at necropsy in the 17th century. The work of Arekion in 1891, Moynihan in 1897 and Dowd in 1900 was of importance in collecting the cases scattered throughout the literature and classifying them.

Moynihan classifies mesenteric cysts as—1. Dermoid, 2. Serous, 3. Chylous, 4. Sanguinous, 5. Hydatid, 6. Cysts of Adjoining Organs, 7. Cystic Malignant disease. He believes in the retention theory of their origin suggested by Virchow and supported by Rokitanski, that the

lympathics are occluded, and dilatation and cyst formations gradually take place. Chylous cysts occur by the occlusion of the chyle vessels or their rupture into pre-existing lymph or serous cyst. The sanguinous cysts arise in a similar manner. In a later paper he gives his opinion that many of these cysts develop from embryonic remains of the Wolffian bodies.

Dowd, on the other hand, believes that with the exception of hydatid and malignant cysts, all the cystic tumors of the mesentery arise from embryonic rests, derived from the Wolffian bodies. The doubt as to their origin is increased by the varied microscopical findings, for in the same specimen different loculi of a multiple cyst may be lined with different sorts of epithelium. A few cysts have been reported with endothelial linings and many, as in this case, present a wall composed simply of fibrous tissue.

The latest classification advanced by Child endeavors to clear up the meaning of the word mesenteric cyst. He contends that a dermoid should be classified as such whether it occurs in the ovary or mesentery or elsewhere. He excludes all forms of cysts from his classification except entero-cystomata which he believes are derived from Meckel's diverticuli and contain smooth muscle fibers in their walls; and cysts arising from the lymphatic system which may be lymphangiomata, simple, cystic, or cavernous, or chylous which are derived from the chyle vessels. It is probable that with the exception of hydatid and malignant cysts, mesenteric cysts, including dermoids, are of congenital origin. The latter arise from ectodermal inclusions. Others arise from embryonic rests of the Wolffian body or primary genital gland; another group are derived from Meckel's diverticuli; while still another class, of which this case is an example, take their origin from a congenital occlusion in the lymphatic system.

It is interesting to note that most of the serous cysts occur in the omentum, the intestinal edge of the mesentery, the mesocolon, and in the retroperitoneal region; while cysts which occur in the mesentery, except at the intestinal border, usually contain chyle.

Mesenteric cysts may be quiescent, to be revealed only at necropsy, or they may give rise to digestive disturbances of an acute or chronic obstructive nature. In their growth they fix the intestine and encroach upon its lumen by appropriating the mesentery to themselves, the bowel becoming flat and ribbon-like where it runs across the surface of the tumor. Pain may be caused by pressure on neighboring viscera or by secondary inflammatory changes.

In the early stage, the tumor lies near the median line in the upper abdomen and is more freely movable than other tumors in this region. Rapid increase in size may be caused by hemorrhages from the vessels of the wall into the cyst; or trauma without hemorrhage may produce a rapid enlargement.

There are four methods of procedure in the treatment of mesenteric cysts—1. Aspiration, which has been practically discarded on account of the large percentage of recurrence; 2. Enucleation, which can only be applied in a limited number of cases owing to the interference with the circulation of the intestine on removal of the cyst; 3. Marsupialization, or drainage of the cyst by stitching its wall to the anterior abdominal parietes; 4. Extirpation of the cyst with resection of the adherent intestine. The latter is the method of choice and though the statement made by Coley three years ago was a mortality of forty per cent., it is undoubtedly lower at the present time. Drainage of the cyst by connecting it with the abdominal wall is useful in cases where a radical removal is impossible or where there is severe infection. Treatment of cysts by this method does not lead to the establishment of permanent fistulae.

XX.

FLAT FOOT IN CHILDREN.

BY ALBERT EHRENFRIED, M.D.

A STUDY of the records of 1000 children under 12 years of age applying consecutively for treatment at the out-patient department of the Children's Hospital, in 1912, showed 440 having some static disability of the feet. These cases could readily be divided into three classes: congenital (18), idiopathic (95), and secondary (327.)

The 18 congenital cases, being the result of mechanical influences acting in utero, may be more properly classified with club foot. They belong to the type which I have described elsewhere[1] as potential calcaneo-valgus. In this condition the foot is not held fixed in the position of deformity, but it hangs flaccid in the normal position, assuming the position of extreme deformity on the application of very slight force, or even under the influence of gravity. This is the most frequent cause of delayed walking in children otherwise normal, which is explained by the fact that in this condition the child loses its ability to balance upon its feet. It is seen soon after birth and later; it is likely to lead to the most aggravated type of flat foot, and it sometimes requires operative treatment.

The secondary cases, which are by far the most numerous (327), include all those in which some primary causal factor is evident: rickets, represented by bow-legs, knock-knees, coxa vara, was present in approximately 200 cases, infantile paralysis in 107 cases, and tuberculosis of the knee, hemiplegia, lead, post-diphtheritic

[1] Ehrenfried: The Occurrence and Etiology of Club-foot, Jour. Amer. Med. Asso., vol. lix, p. 1940.

or spastic paralysis in 20 cases. In many of these the foot symptoms were of minor importance. In a considerable number, however, the diagnosis was not simple and the case was considered one of idiopathic flat foot until continued observation revealed the causal condition. In this inquiry no consideration was given to the type of flat foot, sometimes called traumatic, which arises as the result of wearing a plaster cast for a considerable time, or which occurs in a foot which is bearing the entire weight of the body, on account of disability of the other leg.

The third division, which may be called *idiopathic*, includes all the cases of weak, pronated, or flat feet for which no cause could be assigned, to the number of 95. Of these 52 were boys, of an average age of 6½ years, and 43 were girls, of an average age of 7 years. An examination of the history of these cases showed certain points in common. The condition was evidently due to insufficiency of the muscles supporting the arch of the foot, and was usually part of a general physical debility or lack of muscle tone. Some of the children were well nourished and otherwise in apparently good physical condition. A few were considerably over-weight, but it does not seem to me probable that weight alone, unless it be excessive, can be held responsible in these cases, for in a normal child increase in weight is met by a corresponding increase in power in the muscles of the leg. Bad shoeing must be ruled out in the majority of these cases, as the average child was too young to present marked symptoms from this cause. A considerable number showed evidence of other static disabilities, such as relaxed knees, round shoulders, functional scoliosis, protuberant abdomen, and gastroptosis.

Examination of the histories of 55 cases in which the records were full enough to be of value demonstrated that these 55 children, at an average age of 7 years, had had 147 diseases, including measles 30 times, whooping cough 24 times, chicken pox 11 times, tonsils or adenoid operation 10 times, pneumonia 8 times, scarlet fever, mumps, and glandular abscess each 7 times, bronchitis 5 times, chronic indigestion 4 times, otitis media 4 times, malaria, operation for hernia and appendicitis each 2 times, diphtheria, typhoid, phthisis, meningitis each once, and other conditions 20 times. One is at once struck by the multiplicity of the disorders from which these children suffered, and particularly by the frequency of the occurrence on this list of the infectious diseases, probably much above the average incidence in children at this age. Evidently these conditions are predisposing factors, and the obvious assumption is, that the child, being in poor physical condition as a result of repeated or long continued illness, suffers from a muscular insufficiency which is responsible for the static disability. Poor nutrition, without evidence of any definite illness, also accounts for a certain number of cases.

Attention may profitably be given to the *prophylaxis* of this condition. In the first place this requires regulation of the feeding in infancy and early childhood. Proprietary foods and other substitutes which may predispose to rickets should be carefully avoided in infancy, and later the diet should be well balanced, avoiding an excess of carbohydrates, and supplying plenty of proteids and fresh vegetables or fruit juices. In the second place the spread of infectious diseases and particularly of infantile paralysis, should be controlled so far as possible. This is a matter largely in the hands of boards of health and school and district physicians. Corrective shoeing and proper exercises will go far to prevent disability in children who are delicate, or weakened as the result of illness.

It is probably true that many cases of flat foot in adults have their inception in some condition of the foot which has been overlooked in childhood. *Treatment* should of course be started early, and the outlook for ultimate restoration of function is considerably better than in adult flat foot. Methods depend on the type.

The cases of potential calcaneo-valgus are brought in soon after birth, on account of the evident deformity, or not until 18 to 24 months, on account of delayed walking. Cases seen within the first few weeks respond as a rule very well to treatment by over-correction and retention in plaster of Paris for a few months. The older children are frequently difficult to treat. Mild cases get well with a tilted shoe and instep pad, worn for about two years. Bad cases need a brace, and may have to be operated. The brace I use is just the reverse of the one I have employed in the treatment of equino-varus,—it is a laced shoe which fits the foot, elevated on its inner border, with a jointed external upright, stopped to prevent dorsiflexion, and a T-strap on the inner side.

The treatment of foot disabilities secondary to other conditions, such as rickets and infantile paralysis, is the treatment of the underlying condition. When this has cleared up or is under control, or if the foot symptoms are the chief element, attention should be directed to their relief. In the paralytic foot muscle training is of great benefit, but operation by muscle transplantation or insertion of a silk ligament frequently becomes a necessity.

The cases of idiopathic flat foot as a rule are of a mild or moderate degree, and respond well to treatment, if carried out for a sufficient length of time. Metal plates should be avoided. Massage of the lower legs, exercises carried out persistently under supervision, the leather instep pad and the tilted shoe are usually adequate. Severe cases may require temporarily the brace which I have already described. The rigid feet and the exostoses of the adult are

not seen. Acute cases need rest in bed or fixation in plaster of Paris.

CONCLUSIONS.

First, the diagnosis of weak, pronated or flat foot should not be made inconsiderately. In 327 of the 440 cases the foot symptoms were secondary to some other condition, which required treatment. Continued observation in many apparently simple cases showed mild rickets or unsuspected infantile paralysis as a cause, and less frequently such conditions as tuberculosis of the knee, hemiplegia, or lead, post-diphtheritic or spastic paralysis.

Second, 18 of the primary cases were congenital. These, the result of mechanical influences prior to birth, are more properly classified with club foot; they belong to the type to which I have given the name of potential calcaneo-valgus.

Third, a study of the other primary cases, 95 in number, shows evidence of muscular insufficiency resulting from physical debility as the leading factor in causation. This debility, as shown by the records, is frequently the sequel of an infectious disease, and is particularly apparent when the child has been the victim of a series of infections in close succession. Other static disabilities, such as relaxed knees, functional scoliosis, and gastroptosis are likely to be present.

Fourth, the secondary cases, which were in the majority, were the result of rickets or of rhachitic deformities in approximately 200 cases, of infantile paralysis in 107, and of other conditions in approximately 20 cases. In many of these the foot disability was a minor incident.

Fifth, prophylaxis of foot disabilities consists in combating the two important causes therefor, rickets and the infectious diseases of childhood. Both of these should yield to hygiene. Measures to lessen substitute nursing of infants by means of proprietary foods or improper milk mixtures, and to control the spread of contagious diseases through schools, which, at the present time, are probably the chief agents in the dissemination of infections among children, will result in an important diminution in the incidence of these conditions.

Sixth, treatment is usually effective.

XXI.

PYELITIS IN INFANCY AND CHILDHOOD.

BY EDWIN T. WYMAN, M.D.

PYELITIS is not a rare disease in infancy and childhood, but it is a disease which may be easily overlooked without an examination of the urine in cases of obscure fever.

In the majority of cases there is nothing whatever in the symptomatology to call attention to the urinary tract, the symptoms being merely an elevation of temperature and those common to all febrile disturbances in infancy, such as restlessness, fretfulness and signs of indefinite discomfort. Anorexia is the rule and vomiting is not unusual. The temperature is relapsing in type, often reaching 105°F.

In infants, the physical examination is usually negative, except that pallor is characteristically present. There may be tenderness in the lower abdomen, and in some instances the kidney is palpable, more often on the right than on the left. The spleen may be palpable at the onset of the disease.

In the vast majority of cases the diagnosis can only be made by examination of the urine. Consequently the urine should be examined in all diseased conditions in infancy with indefinite symptoms, especially if febrile, and no physical examination should be considered complete or diagnosis satisfactory in obscure conditions in infancy unless the urine has been examined. Not infrequently these cases of pyelitis are treated for other diseases and as spontaneous cure occurs in many of the acute cases, the presence of pyelitis is never recognized.

Pyelitis in infancy is often associated with more or less intestinal indigestion, and the infant is treated for this condition when the indigestion is really secondary to the pyelitis.

Sometimes the patients object to being handled; are very irritable, and have tenderness of the extremities resembling that in scorbutus. Other cases may have pain and tenderness in the abdomen and have even been operated on for appendicitis. The irregular temperature may suggest malaria or typhoid fever. Some cases may have marked symptoms resembling those in meningitis.

The following are two typical cases in which the diagnosis was overlooked:

CASE 1. Frank N. Age, 3 weeks. The family history was negative. He was a full term baby, and the delivery was normal. He weiged 10 pounds at birth, and at the age of 2 weeks he weighed 11 pounds. He was breast fed, and was a normal, healthy baby up to his present illness. One week before he was seen, he did not take his feedings as well as usual. The following day his temperature was normal in the morning and 100.2° F. in the evening. The next day he did not seem quite as well and his afternoon temperature was 104° F. He was thought to have indigestion and was given two teaspoonfuls of castor oil and an enema, with good result. During the next three days his condition grew worse. He was very irritable and his pallor increased. His temperature was irregular, 103° F. to 104° F. in the evening, and 101° F. to 102° F. in the morning. The temperature had never been normal since the onset. The bowels were constipated, the movements greenish, and contained a considerable number of small soft curds. There had been no vomiting and no convulsions. It had been noticed that the urine was "white like milk

and water." The breast milk was discontinued the day before he was seen and whey was given, with no improvement in symptoms.

Physical Examination. He was a well developed and nourished infant. The skin was clear but pale, and the muscles were flabby. The anterior fontanelle was 4 x 5 cm. and level. The ear drums were normal. The throat, mouth, heart, lungs, and abdomen showed nothing abnormal. The liver was palpable 2 cm. below the costal margin. The spleen and kidneys were not palpable. The extremities were normal.

CASE 2. Mildred T. Age, 13 months. The family history was negative. She was born at full term, after an instrumental delivery. Her birth weight was 8 pounds. She had been breast fed up to the time she was seen and had always been a well, normal baby.

Ten days before she was seen she was taken suddenly sick with fever and chills, and she had a slight cough. The temperature had never been normal since the onset and had been irregular, sometimes reaching 105° F. She had grown more fretful and irritable every day and had lost considerable weight and a good deal of color. Her bowels had been regular and the movements were normal.

It had been noticed that the micturition had been frequent and painful. For two days before she was seen she vomited nearly every feeding, and for 24 hours before she was seen the vomiting seemed to be of a projectile type. The head had been retracted, and there had been rigor and slight twitching of the arms and legs. There had been no convulsions. She was thought to have meningitis.

Physical Examination. She was a well-developed and nourished, very sick looking little infant. She was very pale and flabby. She had evidently lost considerable weight. She was conscious, but very irritable. The head was held slightly retracted, but it could be easily flexed.

The anterior fontanelle was 2 x 3 cm. and level. The pupils were equal and reacted to light. The ears, mouth and throat were normal. The lips and tongue were dry and parched. There were eight teeth. There was no enlargement of the peripheral lymph nodes. The heart, lungs, abdomen and extremities were normal. There was no spasm or paralysis and no neck sign. The knee jerks were present and equal. There was no Kernig or contralateral reflex.

The urine in both these cases was acid and contained slight trace of albumen. The sediment showed many pus cells, free and in clumps, and many motile bacteria. The symptoms and fever in both these cases disappeared within two weeks, with the alkaline treatment, and the urine was nearly free from pus at the end of three weeks.

In a series of 65 cases of pyelitis in infants and children at The Children's Hospital, Boston, 54% were in infants under two years, and 46% were in children beyond two years. Of these cases 63% of the infants were females and 90% of the children were females. Vomiting was noted in 39% of the cases; painful micturition in 36%; and frequency of micturition in 40%. Chills were noted in 15%; and abdominal pain in 16% of the cases. The average leucocyte count in the uncomplicated cases was 19,000; the lowest leucocyte count was 8,000 in a chronic case; and the highest leucocyte count was 62,000 in a very acute case. The temperature varied from normal, in the chronic cases, to 105.5°F. in the acute cases. There was anorexia, anemia, fretfulness and loss of weight in all the cases.

Pyelitis occurred as a complication with other diseases in these 65 cases as follows:—Otitis media, eight times; pneumonia, seven times; infectious diarrhea, four times; bronchitis, twice; intestinal indigestion, twice; measles, twice; typhoid fever, twice; and tubercular peritonitis once.

Some of these cases yielded readily to treatment, the urine clearing up in two weeks; while other cases were more resistant and were only improved at the end of six weeks.

The organisms responsible for the infection in pyelitis, in a large proportion of the cases are the colon bacilli, although staphylococci, streptococci, and pneumococci are sometimes found.

The urine in pyelitis is pale, uniformly cloudy or turbid; the turbidity is due in part to the bacteriuria, and in part to the presence of large numbers of pus cells; chiefly to the latter. The reaction is almost invariably acid, not infrequently highly so, and there is a slight trace of albumen.

Microscopically the sediment is composed of many pus cells, free and in clumps, many motile bacteria and usually a few caudate, small round and squamous cells.

There are three possible modes of infection.

(1) *The Ascending Theory*: The chief arguments in favor of an ascending infection from the urethra are the much greater frequency of this condition in females, most common in diaper age, and the short wide urethra which makes infection easy when the external genitals are soiled by feces.

(2) *The Hematogenous Theory*: That the bacteria are borne to the kidney by the blood stream.

(3) *The Transparietal Theory:* That the bacteria are transmitted directly from the intestines to the kidney.

Morse writes[1] that in the majority of cases in girls, the infection is through the urethra, while this route is very unusual in boys, and then only when there is some evident lesion, such as phimosis causing stasis, severe balanitis, or an infected wound from circumcision. In most cases in boys and in a fair proportion of those in girls, the infection is probably transparietal, while in both sexes it is occasionally hematogenous[1].

PROGNOSIS.

There is practically no danger as to life. With treatment recovery usually occurs in a few weeks, but the condition may persist with intermissions for many months. In some instances

the urine contains bacteria and at times pus for years, although there is no constitutional disturbance. There is very little danger of the process extending to the kidney, or that it will involve anything more than the superficial layers of the pelvis and bladder.

The pathology shows simply a catarrhal condition of the bladder and pelvis of the kidney. Very few autopsies have been made, because the condition is rarely fatal.

TREATMENT.

The alkaline method of treatment will often suffice to cure the disease. Potassium citrate is given well diluted with water, grains X, three times a day for an infant one year old. If the dose is not sufficient to make the urine highly alkaline, larger doses must be given. Another line of treatment is to change the reaction of the urine every three or four days by first making the urine alkaline with potassium citrate, then acid, with sodium benzoate or benzoic acid in doses of grains iii, three times a day for an infant one year old. This changes the reaction of the media and discourages the growth of the bacteria.

If the urine does not clear up under this treatment, hexamethylenamin in doses of from one to three grains should be used. If the urine is alkaline, it should be made acid with sodium benzoate or benzoic acid. The urine should be tested for formaldehyde by Berman's[2] test and the hexamethlyenamin increased until the urine shows the presence of formaldehyde; the urine being carefully watched for irritation of the kidney.

If the trouble still continues, large doses of hexamethylenamin, aided by autogenous vaccines may be used as Freeman[3] advises, gradually increasing the hexamethylenamin to gr. 25 daily for an infant of six months and grains 25-45 a day for an infant of nine to 12 months. Vaccine should be given every three or four days, beginning with a dose of 25,000,000 and increasing to 160,000,000. The large doses of hexamethylenamin should not be continued for more than a week at a time, and then after several days without any treatment, or with alkaline treatment, the hexamethylenamin should be started again at the same maximum dose given before[4]. The urine should be carefully watched for irritation of the kidney.

Local treatment of the bladder is of comparatively no value, because the infection is not localized in the bladder but involves the whole urinary tract.

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[4] Freeman: Am. Jour. Dis. of Children, 1913, vol. vi, no. 2, p. 117.

XXII.

TWO CASES OF CIRRHOSIS OF THE LIVER IN CHILDHOOD.

BY THEODORE ELY, M.D.

While cirrhosis of the liver in children is no longer regarded as an exceedingly rare condition, it is by no means a common one, and that type of cirrhosis which is due to alcohol may still be said to be a most unusual affliction in childhood.

The first case of this kind of which we have a record was reported by Wilks in 1863 before the Pathological Society of London (Pathological Society of London 1863, Vol. XIV.) In succeeding years occasional cases were reported from England, America and the Continent. Among a total of sixty-three reported cases of hepatic cirrhosis of various types R. Palmer Howard in 1887 found ten cases whose cause could be traced to the abuse of alcohol. (R. Palmer Howard in *American Journal of Medical Science*, Oct., 1887) *Haushalter and Richon in 1899 collected twenty cases from the literature. Of these only fourteen came to autopsy and the alcoholic cause of at least one seems very doubtful. In 1907 Bolton of London (Cirrhosis of the Liver in Children—*Clinical Journal*, London, 1907-08) reports that at the time seventy-four cases had been described in the literature. This would scarcely seem a sufficient number to agree with his further statements, that hepatic cirrhosis of some type is found in .2% of all autopsies on children under 12 years of age in England, and that England is noted for its frequency in alcoholic cirrhosis, or with the statistics of various authorities quoted by Rapin (These de Nancy, 1899, Contribution a L'Etude de la Cirrhoe Alcolique) among whom Hebrad traced the origin of seven out of fifty-one cases of hepatic cirrhosis and D'Epine and Picot seventeen out of one hundred to the abuse of alcohol, or with the opinion of Morse (BOSTON MEDICAL AND SURGICAL JOURNAL, Sept. 11, 1902) that alcohol is responsible for from ten to twenty-five per cent. of all cases in children. In a brief but fairly comprehensive review of the English literature since 1907 I have found only two cases reported in this country and but one of these was proved by autopsy to be of the alcoholic type. (Blakely, BOSTON MEDICAL AND SURGICAL JOURNAL, 1910) (Davis—Cirrhosis in a Boy of Two Years—*West Virginia Med-Journal* 1912—12.)

The disease seems to be more common in boys than in girls. The youngest case on record I believe is about sixteen months of age. The average seems to be between eight and eleven years.

The symptoms differ somewhat from those found in the adult. Jaundice is a fairly common symptom in children. Epistaxis is as fre-

* Revue Mensuelle des Maladies de L'Enfance, Mar., 1899.

quent and diarrhoea and vomiting more so than in the adult. Haematamesis is less frequent in children but several cases where this was the immediate cause of death have been recorded. Enlargement of the spleen is practically constant in children as is the hypertrophy of the liver in the earlier stages of the disease. The enlargements of the liver is not only more constant in the early stages in children but often persists until death. Dilatation of the superficial abdominal veins is perhaps less common and slight elevation of temperature more common. Ascites and oedema are about as common but seem to appear relatively later in the course of the disease.

The nervous symptoms in children are confined to marked drowsiness and sometimes loss of speech. Peripheral neuritis, delirium tremens, etc., are practically never seen.

The course of the disease is much shorter than in adults. Complications aside from the embarrassed heart action seem rare and the children usually die of the progressive asthenia.

The pathological changes found at autopsy due to the disease *per se* are practically identical with those found in the adult cases except for the constant splenic enlargement.

The two instances of hepatic cirrhosis in children which I have the privilege of reporting to you were observed in a pair of twins, four years of age, first seen in the medical out-patient department of the Children's Hospital on Oct. 6, 1913, and subsequently observed in the medical wards there.

CASE HISTORY, G. O.

Family History. Father and Mother living and (always have been well) well. Two sisters living and well. Another pair of twins, boys, at 2½ years, living and well. First child died from cholera infantum. Second pregnancy resulted in miscarriage at 3½ months. Fourth pregnancy which followed the birth of first living child also resulted in miscarriage at 3½ months. Neither father nor mother has had sore throat or rash. Both deny specific infection or constant use of alcohol.

Past History. Born instrumentally at full term. Has always been about 4 lbs. heavier than the other twin. His mother says that the infant was black for 24 hours after delivery but then regained normal color and had no paralysis. He was breast fed for 14 months. Had no acute infection until after onset of present illness. Ever since the breast feeding was stopped the mother has been in the habit of giving both children small amounts of brandy at frequent intervals. She started giving three drops every hour, but as the children have grown the dose has been increased until sometimes they have been given a half teacupful at a. time. The mother estimates that the children have each had a quart of brandy on an average of at least 16 drops a day since fourteen months old. The father, who confesses to a "moderate" use of alcohol, tells of having found both boys drinking whiskey by the half-cupful when one morning he came unexpectedly into the dining room, where he had been entertaining a friend on the previous evening and had carelessly left a partly filled quart bottle of whiskey on the table. The mother states that the brandy which was first given in small doses because the infants "seemed puny and had no appetite" was later given in larger doses when the children had a toothache or a pain.

Present Illness. In January 1913 patient developed painful swelling on penis. One week later mother noticed yellowish tinge in sclera. Child developed a voracious appetite with constant desire to drink water. Skin gradually turned yellow and has been more or less so ever since. There was no vomiting at the onset. About two months after onset mother noticed the dark smoky red color of the urine and that it left a red stain on clothes. The stools since onset have averaged from 4 to 5 a day and have generally been clay colored and very foul smelling. For a while under medical treatment they became darker. In July last had a severe attack of measles, and for about a month the jaundiced color of skin disappeared, but the urine and stools retained the characteristics noted. For the past two months the abdomen has been growing larger and the rest of the body thinner and the skin has itched. In that period the gums and buccal mucosa have grown tender and bleed easily. Two weeks ago the mother found the patient's pillow and bed clothes covered with blood. No blood has ever been noticed in urine or stools. Two months ago swelling of fingers at the distal joints was noticed. He is now drowsy and sleeps all the time; no headache, digestion seems good, and he never vomits. Since attack of measles has lost considerable weight. Has never had any convulsions, fever, cough or sore throat. For a month before admission was kept on—fat and sugar—restricted diet without improvement. Child looks and acts drowsy.

Physical Examination. Patient is poorly nourished with little subcutaneous fat. Skin is dry and lax and uniformly jaundiced, rough and in spots excoriated from scratching. Petechial spots on arms and legs. Eyes show marked yellow sclera with reddened conjunctivae. Buccal and nasal mucosa reddened and congested and beneath the buccal and palatal mucosa small punctate hemorrhages are visible. The lips are excoriated and cracked. There is a general glandular enlargement. Heart: Boundaries on percussion are 2½ cm. from the right and 7 cm. from the left of the M. S. L. No abnormality of sounds. Lungs negative. Abdomen distended, convex. There is slight shifting dullness but no distinct fluid wave could be demonstrated. The superficial veins are prominent and somewhat distended. Liver dullness begins above at lower edge of 5th rib in nipple line on the right. The lower edge is distinctly palpable 5 cm. below the free costal border in the nipple line and 5 cm. below the tip of the xyphoid in the median line. The edge is smooth and not very tender. Spleen is much enlarged, the lower pole being palpable 7 cm. below the costal border and 4 cm. from the median line. No other abnormal masses palpable. Extremities show no edema. There is marked clubbing of the distal joints of the toes and fingers. Genitals show no edema. Urine was red, smoky, acid and con-

tained bile but no albumin or sugar. Stools were grayish yellow in color, contained bile, no blood, pus or mucous. Blood count showed nothing remarkable in numbers or character of white or red cells. The hemoglobin was 70% by Tallquist. Wassermann's complement fixation test and Von Pirquet skin test were both negative.

Ten days later on Oct. 16th the physical condition showed little change. Jaundice persisted. The boundaries of the heart, liver and spleen showed no appreciable change by percussion and palpation. The urine and stools both contained bile.

At the request of the parents he was discharged home from the hospital on Nov. 4th, four weeks after entrance. The jaundice was much less marked, as was yellowing of the sclera. The petechial spots on the arms and legs were fewer and the child was scratching much less. The area of cardiac dullness was unchanged. The spleen was felt in the same situation as before. The lower edge of the liver was palpable 3¼ cm. from the costal border in the right nipple line. The urine still contained bile but the reaction was less marked. During the child's stay in the hospital the pulse and respiratory rate ranged within normal limits. His evening temperature during twenty-nine days of observation reached 100 on eight evenings and his maximum was 101.6 reached on one evening. For the rest of the time the daily variations were within normal limits.

The patient was last seen alive on Dec. 9th. After leaving the hospital his condition showed little change until December 6th. The urine remained of reddish color. The stools were described as having grown more normal in character and no blood had been seen in them. Dec. 6th he began to vomit and retained practically no food after this. He coughed up and vomited blood at frequent intervals. The mother noticed that his breathing became more rapid and difficult. He complained of pain in the upper right quadrant of the abdomen which was somewhat relieved by rubbing. On examination his respirations were grunting and labored, rate was about 52 per min. The pulse was too rapid for count, poor volume and tension. The physical signs in lungs were those of consolidation of the right lung extending from the base upward in back to the upper angle of the scapula and in front to the third interspace. In the lower left axilla the breath sounds were much diminished and moist rales were numerous throughout. The left border of the heart was 8 cm. to the left and the right 4½ cm. to the right of the M. S. L. Because of the lung consolidation on the right it was impossible to make out the character of the cardio-hepatic angle or the upper limit of hepatic dullness. The heart action was very rapid but regular and no abnormality of sounds aside from their generally weak character was detected. The abdomen was enormously distended and showed the usual signs of free fluid. Superficial veins were very prominent on both abdomen and thorax. The liver was tender and its lower edge was indefinitely felt 2 cm. below the costal border in the nipple line. The lower pole of the spleen was distinctly felt 5½ cm. below the free costal border in the anterior axillary line. There was marked edema of the genitalia and slight edema of the extremities. Emaciation was more marked and the condition of the mouth worse than on leaving the hospital. The patient died at two o'clock the following morning.

CASE HISTORY, C. O.

Family History. The same as the other child.

Past History. Was delivered normally at full term. Except for having always been the smaller of the twins his past history is not important.

Present History. Began two weeks after the brother's. The first symptom noticed in January, 1913, was the yellowish discoloration of the sclera. The story of his present illness was exactly identical with his brother's except that his attack of measles last July was less severe than his brother's and jaundice has never disappeared. The character of stools and urine, jaundiced and itching skin, painful, easily bleeding gums and buccal mucosa, epistaxis and clubbing of fingers have all been the same as his brother's, and the last four symptoms have appeared at about the same time as the brother's. His abdomen has never grown so large as the brother's. He has never had convulsions or fever, cough or sore throat except with the measles.

Physical Examination. Much the same in its important points as the brother's. Sclera of the eyes is markedly yellow. The buccal mucosa shows punctate hemorrhages underneath, most numerous over the palate. Tonsils are large and fibrous. There is general glandular enlargement. The lungs give no abnormal physical signs. Cardiac dullness extends from 3 cm. to the right to 6 cm. to the left of the M. S. L. The sounds are somewhat irregular in rate and rhythm, the second pulmonic is much accentuated, no murmurs or friction sounds detected. The abdomen is distended, convex, and above the level of the thorax. The upper limit of hepatic dullness is in the 5th inter-space. The lower edge of the liver is smooth, firm, and easily palpable 5 cm. below the costal border in the nipple line and 4 cm. below the xyphoid. The lower pole of the spleen is palpable 7½ cm. below the costal border and 7 cm. from the median line. No free abdominal fluid detected. The superficial abdominal veins are prominent. The genitals show a moderate hydrocele of the right testicle and slight phimosis. The clubbing of the fingers and toes is marked, no edema of extremities, the reflexes are all normal.

The urine was slightly acid and contained bile but no albumin or sugar.

Stools yellow, formed and smooth, contained bile and no blood or pus.

The blood examination showed 5,500,000 red cells and 6,500 white cells per cubic mil. Of the white cells 55% were polynuclears and 45% of the mononuclear type. Hemoglobin was 70% by Tallquist. The Von Pirquet skin reaction was negative. No Wassermann test was made, as it was deemed unnecessary in both cases.

Fragility of the red blood corpuscles in both cases was tested by the Senior House Officer, Dr. A. E. Myers, with the assistance of Dr. Karsner, using hypotonic salt solution in the percentages running from .2% to .8% in steps .05%. In the case of G. O. hemolysis began at 45%, was incomplete at .2%. In case of C. O. hemolysis began at .4%, was incomplete at .2%. In the normal control hemolysis began at 45%, was complete at .25%. This would indicate that the resistance of the corpuscles of both patients is slightly increased. This is shown more markedly in the

point of complete hemolysis which occurred at less than .2%, as compared with complete hymolysis which in the normal control occurred at .25%. The value of the experiment lies in the fact that it served to indicate a decreased fragility of the red blood corpuscles in our two patients, whereas in familial jaundice the fragility is said to be increased.

On Oct. 22nd, sixteen days after admission, the general condition showed little change. The jaundice and condition of the mouth were the same, the boundaries of the heart, liver and spleen showed no change. No free abdominal fluid could be detected. The urine contained bile in slightly decreased amount.

He left the hospital on Nov. 4th., four weeks after admission, with condition unchanged except for a decrease in the depth of the jaundice.

During his stay of twenty-nine days in the hospital his evening temperature reached 100 on only seven evenings, and only twice attained the maximum of 101° Farh. During the rest of the time the daily temperature variations were within normal limits. The pulse rate and respirations varied only within normal limits.

While in the hospital both boys on questioning would express a most enthusiastic desire for brandy.

He was last seen on December 9th, approximately two months after coming into the hospital. Since his discharge the urine is said to have become fairly normal in color. The stools have remained hard and white. Recently he has grown more apathetic and drowsy, and if undisturbed sleeps at least half of the day. On examination pulse and respiratory rate were normal. Jaundice and the yellowish discoloration of the sclera were somewhat less marked. The heart area was within normal limits. At the apex a slight systolic murmur faintly transmitted to the anterior axilla was heard, second pulmonic sound much accentuated, action slightly irregular. The abdomen was only moderately distended and no free abdominal fluid was detected. The superficial abdominal veins were fairly prominent, the liver edge was distinctly palpable 7 cm. below the costal margin in the nipple line and 7½ cm. below the xyphoid. The tip of the spleen was felt on a line with the umbilicus and 7½ cm. to the left of it. The condition of buccal and nasal mucosa was practically the same as on discharge.

For the performance of the autopsy on the first case and the subsequent pathological and histological work I am indebted to Dr. Howard T. Karsner of the Pathological department, Harvard Medical School. The autopsy was performed thirty-six hours post-mortem. In brief the anatomical diagnosis is as follows: Acute fibrinous pericarditis with effusion. Chronic interstitial myocarditis, Passive congestion of lungs and conglomerate tuberculosis of left lung. Miliary tuberculosis of right lung. Lobar pneumonia of right lung. Atrophic cirrhosis of liver with regeneration. Miliary tuberculosis of liver. Chronic passive congestion of spleen with follicular hyperplasia and miliary tuberculosis. Passive congestion of intestines. Ascites. Slight arteriosclerosis. Miliary tuberculosis of left peri-bronchial, superior mediastinal, mesenteric, retroperitoneal and subhepatic lymph nodes.

The more detailed report of the gross pathological findings is as follows:

Body. That of a poorly nourished, white male child showing moderate jaundice, no rigor, marked liver mortis and green discoloration over the distended belly. The lower extremities and the forearms show numerous punctate hemorrhages.

Primary Incision. Shows a thin panniculous adiposis and dark red musculature, no bleeding.

Peritoneal Cavity. Contains an unmeasured but large amount of slightly cloudy yellowish-brown, limpid fluid. Peritoneum smooth and glistening throughout. Omentum is very much congested and the organs are all in normal position, spleen reaching about 4 cm. below the costal margin, the liver not being visible.

Thoracic Cavity. Shows a markedly distended pericardium filled with slightly cloudy blood-stained fluid containing flakes of fibrin. Thymus not visible.

Pleural Cavity. Left pleural cavity is smooth and glistening throughout. Right cavity throughout its entirety shows easily broken up fibrinous adhesions and the sac contains a slight excess of slightly cloudy blood-stained limpid fluid containing flakes of fibrin.

Lungs. Left lung is of moderate volume, crepitant throughout except for a very small area in the apex anteriorly and of generally dark red color. Organ cuts with normal resistance and shows a dark red, bleeding, soft moist cut surface. The point of consolidation in the apex anteriorly is found to be near a yellow bulging caseous mass measuring 1 cm. in diameter, fairly well encapsulated, but showing in the immediate neighborhood several small slightly projecting gray tubercles. The pulmonary vessels are normal. Peribronchial lymph nodes are enlarged, adherent to one another uniformly caseous and continuing into the superior mediastinal lymph nodes. Similar involvement is found around the bifurcation of the trachea and the left side of the trachea above the bifurcation. Bronchi show slight congestion, but otherwise normal. The right lung is voluminous and solid, weighs 320 grams in contrast to a weight of 140 grams for the opposite lung. The organ is covered by thin loosely attached, blood-stained fibrinous exudate. The organ is completely consolidated, cuts with normal resistance and above throughout all three lobes dark red, firm, finely granular cut surface which on scraping appears to be dry. Throughout this cut surface, however, a relatively small number of minute, non-projecting, vaguely defined, gray and yellowish-gray masses are found which have the gross appearance of miliary tubercles. They are not closely associated, however, never confluent and in a single section do not number more than 10 to a lobe. The pulmonary vessels of this side are normal, the bronchi are the same as on the other side and the lymph nodes are somewhat enlarged, soft and pink and do not show any caseation.

Pericardium. As noted above contains a great excess of fluid.

Heart. Of about normal size and weighs 120 grams. The epicardium is covered throughout by a blood-stained, loosely adherent, fairly thick fibrinous exudate, thicker over the left ventricle anteriorly than elsewhere and giving rise to a typical shaggy appearance. The hemoglobin staining, however, is extreme. The muscle cuts with normal resistance and shows a retracted, firm, reddish-gray cut surface in which there appears to be an increase of connective tissues. The mitral,

aortic, pulmonic and tricuspid valves show nothing abnormal. The endocardium throughout is thin and transparent and the columnae carnae and papillary muscles normally rotund.

Liver. Weighs 400 grams, measures 16.5 x 9.5 x 3.5 cm. The organ is extremely firm and shows a slightly thickened, smooth capsule with numerous areas in which the sub-capsular veins are considerably distended. The edges are rounded. In several places there are points of nodular bulging immediately under the capsule. These nodules are spherical yellow-white, very well defined and bulge in the cut surface. Their diameters range between one and three millimetres and they have more the appearance of tubercles than of liver substance. Organ cuts with leathery resistance and shows a non-bulging, firm, gray cut surface throughout. Projecting into the cut surface and not clearly visible from the outer surface except in the Spigelian lobe are areas fairly definitely defined, ranging from 2 to 4 mm. in transverse diameter, yellow in color with slightly depressed red centres, generally soft consistence and much more numerous in the right lobe than in the left lobe. In fact, the left lobe is almost a solid mass of this dense leathery, gray, very nearly homogeneous connective tissue. The gall bladder and bile ducts are normal.

In the small intestines at about the middle of the ileum is a small, slightly depressed irregular ulcer generally circular, measuring about 2 mm. in transverse diameter with slightly undermined edges and yellow nodular masses in the elevated margin. A similar ulcer is found at the region of the splenic flexure in the large intestine.

Spleen. Weighs 140 grams, measures 14 x 7.5 x 2.5 cm. It is large, shows a thickened, opaque capsule and is distinctly softened. It cuts with slightly increased resistance and shows a slightly bulging cut surface in which both follicles and trabeculae are distinctly more prominent than normal. In addition there is found in the cut surface a number of slightly projecting well defined, aphorical, yellow nodules which grossly appear to be tubercles.

Adrenals. Show post-mortem congestion.

Kidneys. Weigh together 220 grams. They appear to be slightly enlarged and are extremely soft, capsule strips with ease, leaving a smooth, marked congested outer surface. Organs cut with slightly diminished resistance and show a bulging, soft, dark red, slightly bleeding cut surface. The cortex is thickened and bulging; pyramids sharply defined and purple. Peripelvic fat normal. Ureters and bladder normal.

Lymph-Nodes. Mesenteric, retro-peritoneal and sub-hepatic lymph nodes all show enlargement and are soft. Several of them in transverse section show a bulging cut surface in which are several nodules projecting above the cut surface, fairly well defined, yellow and of the gross character of miliary or small conglomerate tubercles.

Aorta. Shows throughout its length similar fine streaks of thickening and yellowing of the intima to that described in the ascending part.

"On microscopic examination, the right lobe of the liver shows very marked thickening of the capsule of Glisson with marked proliferation of bile ducts and moderate infiltration focally of lymphocytes. The parenchyma shows cloudy swelling, fatty degeneration and central necrosis. Bile pigmentation is found peripherally in many of the lobules. The sections from the left lobe fail to show any remaining parenchymatous tissue; but the central vein, much fibrosed, can be made out and the capsule of Glisson can be distinguished. In the position of the parenchyma, however, there is a marked overgrowth of connective tissue and proliferation of bile ducts. These ducts show low cuboidal epithelial, occasionally show clubbed extremities and in a few cases contain bile, but no transformation into liver cells can be seen. The diagnosis is a cicatricial atrophic cirrhosis, following some acute general destructive lesion. Miliary tuberculosis is also present."

Neither the pathological nor histological findings in this case lend much support to the diagnosis of an alcoholic cirrhosis in the pathologists' opinion. On the other hand, they do not completely discredit this diagnosis and the pathologist can suggest no other more probable cause than alcohol for the changes found in the liver. The histological picture suggests most strongly an acute destructive process such as is seen in acute yellow atrophy or acute atrophy due to phosphorus poisoning. The history, symptomatology, especially the absence of acute gastroenteric symptoms, the comparatively long course all tend to discredit this diagnosis. Furthermore, both children apparently were attacked within a period of three weeks by a disease that in both has presented one at a time symptoms compatible with the diagnosis of an alcoholic cirrhosis, and in both was presumably due to the same cause. It seems most improbable that an acute atrophic process of the idiopathic type or due to poisoning or even to intestinal toxemia could originate in both children at almost the same time and then present in both the same symptomatology and protracted course. The other more common causes of hepatic cirrhosis are fairly conclusively ruled out, I think, as follows:—

1. Congenital lues, by the personal history, negative Wassermann test, the symptomatology, and so far as I now know by the pathological and histological findings.

2. Cardio tubercular cirrhosis, of the type described by Hutinel (quoted by Morse, *ibid*), by the absence of any definite signs or symptoms of cardiac or pericardial origin, by the failure of the Roentgen ray to indicate any pericarditis or mediastinitis, and by the fact that the pericarditis found at autopsy was evidently an acute process of recent origin, and there were no old adhesions, and also no valvular lesions found in the heart.

3. Cirrhosis due to acute infections seems fairly satisfactorily ruled out by the negative history of any acute infection except measles and the fact that the symptoms of liver impairment had been present at least for six months before the attack of measles.

In conclusion from all the evidence now at hand and with full appreciation of the rarity of the condition I am inclined to believe that in both children the initial process was a cirrhosis

of the liver due to abuse of alcohol. I am not sufficiently familiar with the pathological changes in the livers of children dying from acute liver degeneration as a sequel to one of the acute infections to advance the idea as anything more than an hypothesis, but it would seem at least possible that in the one case which has come to autopsy the pathological picture might be accounted for by an initial alcoholic cirrhosis complicated by an acute destructive process as a sequel of the measles infection, and later followed by attempts at regeneration of the liver tissue. The whole picture of course being further complicated by an acute general miliary tuberculosis and terminated by the attack of lobar pneumonia.

For the privilege of reporting both cases I am indebted to Dr. Thomas Morgan Rotch, visiting physician at the Children's Hospital.

XXIII.

The Report of a Case of Multiple Bone Tuberculosis Atypical in its Distribution and X-Ray Appearances.

By Henry J. Fitz Simmons, M.D.

Believing that the report of cases which are unusual and which have been studied by the best methods of the present day may lead to a wider dissemination of knowledge and subsequent more accurate diagnosis I report the following case.

This patient J. R., a boy of sixteen months, came to the Out Patient clinic of The Boston Children's Hospital May 3rd, 1913. The child was born in Boston of healthy parents who are still well and strong and show no signs of organic disease. He was breast fed five months and has always had good care.

Four months before entrance the mother noticed a lump in the child's abdomen which has gradually grown smaller. She brought the child to the clinic for diagnosis and treatment of lumps upon the head.

On entrance the child appeared well developed and well nourished. The skin upon his face was clean and of good color. His hair and nails appeared to be normal. His head was of normal size. Both pupils were equal and reacted to light and distance. The right external auditory meatus contained a foul smelling discharge. The left ear appeared normal. Over the right parietal portion of the skull were three tumor masses, each about ¾ inch in diameter. Two appeared hard and definitely connected with the bone, the other was fluctuant, neither was reddened nor was there any increase in the surface temperature. The posterior cervical and posterior auricular glands were somewhat enlarged but not tender. At the outer canthus of each eye there was a small

Fig. 1.—Showing tumor mass beneath eyes and tumors over the right parietal region of the skull.

fluctuant reddened area about the size of a green pea. Along the descending ramus and angle of the lower jaw on the left side was a nodular thickening which was neither tender nor reddened. The child's mouth was practically negative. No increase in the adenoid tissue was discernible. Teeth were in good condition and the mucous membranes of good color.

The examination of the chest revealed good development with no signs of rickets. No nodulation could be made out along the course of the ribs. The heart percussed within normal limits and its action was regular as to rate and rhythm. The sounds were of good quality and no murmurs were heard. The lungs showed no areas of dullness, no rales nor adventitious sounds.

The abdomen was soft, easily palpated and no masses nor tenderness was found. The liver and spleen percussed within normal limits but the edge of the liver could not be felt.

There was no enlargement of the iliac or inguinal lymph glands.

On the surface of the right thigh are a few small areas that are covered with dark crusts and are surrounded with an area of induration. The right femoral region appeared normal save for these skin lesions and a general thickness about the lower end. This thickness is above and outside the knee joint.

In the region of the upper third of the right tibia on its anterior aspect one could feel an area of thickening about 2 inches long by 1 inch wide.

Beneath the external malleolus and extending towards the cuboid and over the region of the astragalus is a large, tense area of swelling.

The right upper arm appears normal save for some thickness at the lower end of the humerus.

FIG. 3.—Showing lesion in right tibia before operation.

FIG. 6.—Showing lesions about right elbow.

This thickness does not interfere with any movement of the elbow joint. Over the right radial epiphysis is a swelling which is smooth and not attached to the skin, but which is slightly tender. This tumor is apparently connected with the bone beneath. The right hand shows at the end of the fourth metacarpal a pustular lesion covered with a dry scab. The lesion is surrounded with an area of induration ¼ inch in thickness

The left upper leg appeared normal except that two inches below the trochanter is a small indurated dark colored lesion which appeared very superficial. This lesion is about ¼ inch in diameter. Just below the knee and on its outer aspect is a similar skin lesion which appeared to be fluctuant.

The left lower leg presented nothing abnormal except a few scattered skin lesions. Over the first metatarsal of the left foot on the inner side was an area of swelling somewhat reddened but free from fluctuation. This swelling extended from the toes to the ankle joint. The left humeral region presented nothing abnormal. On the extensor surface of the upper third of the left ulnar was a tumor mass which appeared to be connected with the bone but did not involve the skin. This mass was not tender, reddened nor fluctuant.

The left hand presented a fusiform enlargement of the first two phalangeals of the first finger, upon which are dark crusts which were dry and showed no evidence of recent discharge. There was motion in all joints of this hand.

The Wassermann reaction taken at this time was negative. The Luetin test was negative. The Von Pirquet reaction was strongly positive. His blood examination showed leucocytosis 15,600; polyneuclear forms 60%; lymphocytes 40%. There was at this time no myelocytosis present. His urine examination was negative. No Bence-Jones bodies could be recovered from his urine.

Oct. 3, 1913. While the child was under ether a section containing skin and cavity of the two superficial lesions in the left thigh was removed. These were placed in sterile tubes and sent to the pathologist for diagnosis. Both of the cavities contained thick yellowish pus similar to that removed from tubercular cavities. In addition a typical pyogenic membrane was found and easily removed from each. The child made a good recovery and five days after the operation the areas on this leg were discharging moderately and healing in gradually. Twelve days after the operation these lesions had entirely healed without induration or secondary infection.

Oct. 21, 1913. Under ether the small fluctuant mass over the right parietal region was entered but the content of the cavity was too thick to allow aspiration. The needle was withdrawn and sufficient sero-purulent material squeezed out to afford material for culture. A three inch incision was made over the crest of the right tibia immediately below the tibial tubercle. Dissection was carried down without bleeding to the periosteum which was incised over the swelling observed in the bone. A piece of cortex one inch long and one quarter inch wide was removed with a chisel. On the removal of this piece of cortex there escaped some yellow thick purulent material from what appeared to be a well defined abscess cavity. This cavity was lined with a definite membrane which was easily removed. The cavity was wiped out with gauze and the wound closed loosely with interrupted sutures with a small wet wick left protruding between two sutures. The child made a perfectly good recovery from the operation and the wick which had been inserted was removed

after twenty-four hours. The wound at that time was clean and free from induration.

Since the operation the open areas on the left thigh were dressed and were healed solidly in two weeks. The operative wound on the tibia healed by first intention. The child seemed to be doing well except that the swelling which had been noticed on the lower lid and at the outer canthus of each eye increased considerably in size until at this date (Nov. 10th) each was as large as a cherry. The skin over these masses was very much thickened and reddened. Fluctuation was very easily obtained. The three tumor masses over the right parietal region of the skull were still present. The tumor mass which was aspirated is now reddened and showed signs of having become secondarily infected.

Nov. 11, 1913. A small incision about ¼ inch long was made in the dependent portion of each tumor mass located in the cellular tissues under the eyelids. The contents of these abscesses were gently expressed and the opening closed with collodion and cotton. The abscess located over the external malleolus of the right foot was incised, its contents expressed and the wound closed tightly.

Nov. 18, 1913. The right arm was given the usual iodine preparation and under ether an incision was made over the cavity as outlined by the x-ray, two inches below the elbow joint. Considerable induration about the bone at this point was demonstrated. The cortex was then chiselled through and the cavity opened. From this cavity a large amount of yellow caseous material was removed. This cavity was lined with a definite membrane and was about 1 inch in length by one half inch in width. It was swabbed out with iodine and the wound was closed with interrupted sutures without drainage. One of the tumor masses in the right parietal region was opened with the removal of a small amount of yellow purulent material and a small bone sequestrum. The lining wall of the cavity was definite and easily removable. This wound was closed tightly with the exception of a small rubber drain which was left in for twenty-four hours.

Dec. 10th, 1913. The general condition of the child to-day is much worse than it was one month ago, notwithstanding the fact that the child has had the benefit of out-door treatment at the Convalescent Home at Wellesley. The two areas on the parietal region, which were operated upon still show some nodulation. The one that was operated on as a clean wound has completely closed, but the one which was aspirated is still discharging and seems to have become a sinus. The tumors under the lids of both eyes have disappeared but in their place are two ulcerative surfaces ¼ inch in diameter from which exudes purulent material. The area which was incised on the left ulnar is still tender and shows signs of thickness to the same degree that it did previous to the operation. The skin lesions which were found in different parts of the body have now disappeared. The operative wound of the old lesion in the upper portion of the tibia has healed solidly, but there is evidence of bone proliferation beneath. On the lateral aspect of the right foot there is a discharging sinus. This was the situation of the old abscess which was incised. The lower extremity of the right radius particularly on the inner side seems to be somewhat larger than it was two weeks ago and is distinctly tender on palpation. The fusiform swelling of the index finger of the left hand is still present but not discharging.

FIG. 4.—Showing lesion in right tibia, seven months after operation.

A comparison of the x-ray plates taken at an interval of 7 months is interesting in view of the pathological report to follow.

Figure 1 shows lesions on the skull and the tumor mass beneath eyes previous to the operation.

Figure 3 shows the lesion in the right tibia before operation. Figure 4 shows the same lesion four months after the operation.

Figure 6 shows the lesions about the right elbow. The lesion in the ulnar has since been operated upon.

The child on December 10th had a positive Von Pirquet skin reaction. The leucocyte count was 7,800 of which 58% were polyneuclear forms, 42% were lymphocytes and the blood showed no myelocytes. The urine examination was negative. No Bence-Jones bodies were obtained.

The bacteriologists have been unable to grow the material sent to them from the numerous operations, on the usual laboratory culture material.

The pathologist reports as follows: The specimen from the ulnar shows typical tubercles, necrotic central areas surrounded by tubercles and necrotic bone trabeculae; there is here as in the tibia evidence of osteal proliferation. The specimen from the tibia consists of a fragment of cortical bone having adherent to its inner surface a mass of greyish tissue 4 mil. in diameter. A section through the fragment of bone and adherent mass shows the latter to contain morthologically typical tubercles, solitary and multiple surrounding areas of necrosis. There is an erosion of the cortical bone in the region adjacent to the tubercular tissue. The periosteal surface of the bone shows distinct osteal

proliferation with the formation of new trabeculae. The specimen from the skull marked septic shows necrotic debris only, the specimen from the skull marked clean shows necrotic debris with peripherally poorly formed tubercles.

I wish to acknowledge my indebtedness to Dr. Halsey B. Loder of the department of Surgical pathology of the Harvard Medical School, for the pathological work done on this case.

XXIV.

THE SIGNIFICANCE OF THE VON PIRQUET REACTION IN SURGICAL TUBERCULOSIS IN CHILDREN.*

BY L. BRUCE ROBERTSON, M.D.

Of the various tuberculin reactions, that described by Von Pirquet in 1907, has, in the hands of the majority of observers, proved to be the safest and least disturbing. Of the other reactions, namely the subcutaneous, the ophthalmic and the per-cutaneous or Moro reaction, suffice it to say that the sometimes unpleasant sequelae of the first, the local disturbance of the second, and the variability of the third are enough to recommend the simplicity and ease of the cutaneous test. The explanation[1] of the local reaction in the Von Pirquet test is still theoretical, but it is believed to be due to a hypersensitivity of the infected organism displayed on reinfection, accounted for by the presence of antibodies or bacteriolysins which have been produced as a result of the primary infection, the mechanism of the reaction consisting in the breaking up of the introduced virus and the liberation of a toxic substance in the skin, with its inflammatory effect at the point of inoculation. Occasionally when the test is negative at the first trial, a second attempt a short time later will result in a positive reaction. It is doubtful if an individual can be sensitized by the tuberculin absorbed at the first inoculation to such an extent that he will react, solely on that account, to the second inoculation.[2] The explanation may lie in the natural progress of the disease or in the action of the tuberculin on some latent focus irritating it to such a degree that antibodies are formed which give rise to the reaction at the second inoculation.

The method of application of the Von Pirquet test pursued at the Children's Hospital, Boston, is as follows: The skin over the anterior surface of the forearm is cleansed with 70% alcohol and allowed to dry. Two very small drops of the undiluted old tuberculin ("O. T.") are placed upon the prepared area about four inches apart, a circular control scarification extending into but not through the skin is now made midway between the drops by means of the ordinary watchmaker's screwdriver, and similar scarifications are made through the drops of tuberculin. The arm is held either by patient or nurse until dry, a matter of a few minutes.

The reaction due to trauma is seen in practically every case and is of no importance. It consists of a wheal about each scarification followed by a zone of hyperemia, which disappears within a few hours. The true reaction consists essentially of a hyperemic indurated zone about the scarification and appears as a rule within the first eighteen hours, becoming most pronounced during the second 24 hours and fading gradually in the next three to six days, leaving a desquamating, sometimes pigmented, area. In the very intense reactions, vesiculations may occasionally occur, the induration is more pronounced and the color a deep reddish purple. The periphery of such an area may be jagged with reddish streaks along the course of the superficial lymphatics leading from the area of reaction. One of this nature subsides slowly, and it may be two or three weeks before the desquamation and pigmentation have disappeared.

The object of the present investigation was to determine the reliability of the Von Pirquet reaction in surgical tuberculosis, particularly that of bones and joints. The statements made apply rather to the more severe types of bone and joint infection as the less severe types are treated in the out-patient department without being admitted to the wards.

The material consists of some 350 cases on which the Von Pirquet reaction was tried, collected from the records in the last 4 years. The children were all under 12 years of age.

CASES ADMITTED TO HOSPITAL WITH DIAGNOSIS OF TUBERCULOUS DISEASE OF THE SPINE

Number of cases, 71. Ages from 14 months to 10 years. Number of positive Von Pirquet reactions, 65. Cases in which the reaction was negative, 6.

CASE 1. G. A. Age, 18 months. Duration of symptoms, 3 months. Patient had history of pneumonia following whooping cough 6 months before, and signs of pulmonary involvement were still present. The lower lumbar vertebrae were affected and a large lumbar abscess present was opened. Child showed a severe grade of toxemia and died in hospital after developing an empyema.

CASE 2. E. W., 7 years of age. Duration of symptoms, 3 months. A second Von Pirquet test 5 days after the first one resulted in a positive reaction.

CASE 3. E. S., 9 years of age. Admitted with a question of tuberculous disease of the lumbar vertebrae. The x-rays were negative and the whole condition entirely cleared up in 10 days, probably a sprain of spine.

* From the Orthopedic Department, Children's Hospital, Boston.

CASE 4. E. F. Age, 3½ years. Admitted with question of tuberculous disease of spine and knee. This was probably not a tuberculous condition as the condition had entirely cleared up in 6 months.

CASE 5. D. St. H. Age, 8½ years. T. B. spine and knee, with discharging sinus; duration, 5 years. Von Pirquet negative.

CASE 6. P. N. Age, 3½ years. Tuberculous disease of spine. Double psoas abscess. Duration of symptoms according to history, 1 month. Von Pirquet negative.

One case with positive reaction later proved to be an acute exacerbation of a chronic cervical adenitis.

CASES ADMITTED TO THE HOSPITAL WITH DIAGNOSIS OF TUBERCULOUS HIP DISEASE.

Number of cases, 74, ages from 10 months to 11 2-3 years. Number of positive reactions, 67. Cases in which the reaction was negative, 7.

CASE 1. M. M. Age, 2 years. Von Pirquet tried 6 months later and positive reaction obtained.

CASE 2. G. H. Age, 2½ years. Von Pirquet test negative in May, 1910. The patient had had hip symptoms for 8 months, chronic bronchitis since measles two years before, and general condition was poor. Several months later she developed pulmonary tuberculosis. A second Von Pirquet test was tried (Dec. 4, 1913), and found positive.

CASE 3. W. C. Age, 7 years. Clinical history of 1 year duration. Von Pirquet reaction negative. The case was under observation only two weeks and has not reported to the out-patient department since, so that diagnosis is still unproven. X-ray showed an anatomically incipient process in hip.

CASE 4. A. C. Age, 4 years. Tuberculosis of hip with abscess formation. Duration of symptoms, 10 months. Nothing to account for negative reaction. Attempt made to follow up case, but child had been taken to New Hampshire.

CASE 5. E. G. Age, 2 years. Admitted with question of T. B. hip. Duration of symptoms, 1 month. Leucocytes, 22,000. Four days after admission abscess in right iliac glands was opened and drained. Patient was discharged from hospital 1 month later with abscess almost healed and hip symptoms having subsided to a considerable degree. Diagnosis suppurative iliac adenitis.

CASE 6. J. C. Age, 2 years. Admitted with question of tuberculosis of hip. Duration of symptoms, 3 weeks. The x-ray showed a destructive process in the great trochanter. Seven months later the child returned to the out-patient department wearing no apparatus and condition apparently cured.

CASE 7. J. K., 2½ years of age. Diagnosis, tuberculosis of hip with pathological dislocation. The patient showed a very severe grade of toxemia, and pathological examination of tissue obtained at operation on the hip showed the presence of tuberculosis. Three successive Von Pirquet tests were negative.

CASES ADMITTED TO HOSPITAL WITH DIAGNOSIS OF TUBERCULOUS DISEASE OF THE KNEE.

Number of cases, 21. Ages, 2-8 years. Number of positive reactions, 20. The only negative reaction was in a boy 6 years of age. Duration of symptoms, 2 years. Von Pirquet test was tried on four different occasions and found negative.

CASES ADMITTED TO THE HOSPITAL WITH DIAGNOSIS OF TUBERCULOUS DISEASE OF THE ANKLE.

Number of cases, 14. Age, 2-5 years. Number of positive reactions, 14.

CASES ADMITTED TO THE HOSPITAL WITH DIAGNOSIS OF BONE OR JOINT TUBERCULOSIS ELSEWHERE THAN MENTIONED ABOVE.

Number of cases, 7. Number of positive Von Pirquet reactions, 7. Shoulder, 1; radius, 1; wrist, 1; dactylitis, 2; osteomyelitis of tibia, 1 (proven by pathological examination of bone obtained at operation); os calcis, 1. Totalling those cases in which a definite diagnosis of *bone or joint tuberculosis* could be made, we find 3.2 per cent. of negative reactions in 182 cases.

Of other tuberculous conditions for which patients were admitted there were 20 cases, in all of which the Von Pirquet reaction was positive. This list comprises: Tuberculous cervical adenitis, 14 cases; tuberculous peritonitis, 2 cases; tuberculous kidney, 1 case; tuberculous abscess of thigh, 1 (diagnosis proven by pathological examination); tuberculosis of hernial sac, 1 case; multiple tuberculous lesions, 1 case.

Of cases admitted with a diagnosis other than that of tuberculosis there were: Rickets, 20 cases. The Von Pirquet reaction was negative in 18 cases. Positive reactions.

CASE 1. Patient aged 3½ years with knock knees. Showed no clinical evidence of tuberculosis.

CASE 2. Patient aged 3 years with knock knees. Showed healed cervical adenitis with scar in neck.

Infantile paralysis, 18 cases. Von Pirquet reaction negative in 16 cases. Positive reactions.

CASE 1. Patient aged 11½ years, has slight enlargement of cervical lymph nodes. Patient's father died of pulmonary tuberculosis.

CASE 2. Patient, aged 5¾ years, showed palpable lymph nodes in anterior triangles of neck.

Osteomyelitis, 21 cases. Von Pirquet reaction negative in 16 cases. Positive reactions.

CASE 1. Age, 10 years. No clinical evidence of tuberculosis.

CASE 2. Age, 8 years. No clinical evidence of tuberculosis, but a family history of tuberculosis was present.

CASE 3. Age, 3¼ years. Von Pirquet reaction was negative in the first trial and positive 1 year later when patient was found to have developed cervical adenitis.

CASE 4. Age, 3¾ years. Patient shows old tuberculous glands of neck.

CASE 5. Age, 10 years. Patient had enlarged palpable cervical glands. The father died of pulmonary tuberculosis.

Congenital deformities, 28 cases. Von Pirquet reaction negative in 26 cases. Positive cases.

CASE 1. Age, 5 years. Patient showed no clinical evidence of tuberculosis.

CASE 2. Age, 2½ years. Patient had tuberculous glands of the neck.

Arthritis (non-tuberculous), 5 cases. The Von Pirquet reaction was negative in 4 cases.

In the single positive case, a child aged 6½ years, with multiple arthritis following otitis media, a chronic otitis media was still present which was not definitely non-tuberculous.

Synovitis of hip, 8 cases; of knee, 1 case. Number of negative reactions, 8.

In the 1 positive case, a child 3 years of age, there was no clinical evidence of tuberculosis, but the father and one sister have pulmonary tuberculosis and the mother died of it.

Epiphysitis of femur, 4 cases. Von Pirquet reaction negative in one case. Of the 3 cases in which positive reactions were obtained none showed any definite evidence of tuberculosis, although one showed enlarged tonsils and another had a family history of tuberculosis.

Flattened head of femur,[3] 2 cases, both of which gave positive Von Pirquet reactions. In neither case was there other clinical evidence of tuberculosis. One case gave a family history of tuberculosis.

Of other conditions, including acute suppurative lymphadenitis, pyogenic abscesses, sarcoma, traumatic bow-leg, renal calculus, hematoma of the abdominal wall, rupture of the liver, septic ankle, progressive muscular atrophy empyema, syphilitic periostitis, cirrhosis of liver, infectious diarrhea, scoliosis, cyst of neck, cyst of femur, ovarian cyst, Volkmann's ischaemic contracture, burns of body, hernia, hydrocele, appendicitis and pericolic adhesions, there were 43 cases, of which 36 showed negative Von Pirquet reactions. Of the cases in which a positive reaction was obtained, one had enlarged submerged tonsils, another had enlarged anterior cervical glands, while the remaining five showed no clinical evidence nor family history of tuberculosis.

To sum up, in all cases having clinical evidence of surgical tuberculosis, either in bone or soft tissues, 2.9% showed negative Von Pirquet reactions. In those cases not showing definite clinical evidence of tuberculosis, although some showed enlarged anterior cervical glands and others gave a family history of tuberculosis, 14% showed positive cutaneous reactions.

In the apparently non-tuberculous cases, the reaction is more frequently negative in the younger children, as seen from the following:

0-4 years, 48 cases. Positive reactions in 10%.

4-8 years, 61 cases. Positive reactions in 14.5%.

8-12 years, 40 cases. Positive reactions in 17.5%.

The reaction may be regarded as specific, and the fact that it is positive in a moderately small percentage of clinically non-tuberculous children does not outweigh its value as a diagnostic test. From the above figures it must be concluded that the Von Pirquet reaction is fairly reliable in children under 12 years of age, but that it has less significance where the patient shows enlargement of the anterior cervical lymph nodes or gives a family history of tuberculosis. The frequency of positive reactions in cases giving a family history of tuberculosis is well shown by Brown[4] in his statistics from the Babies' Hospital, New York. The tuberculous lesion may not necessarily be active, but up to the present time there has been no recognizable difference between the local reactions occurring in active and those in presumably latent cases.[5] It is stated that the reaction may be absent where severe toxemia is present,[6] and this fact would seem to be borne out by the two negative reactions occurring in two of the above-mentioned cases, one of tuberculous hip and one of tuberculous spine.

There is a much greater proportion of positive reactions in apparently non-tuberculous cases than of negative reactions in those clinically tuberculous.

The Von Pirquet reaction is said to be absent in measles during the incubation period and for several days after the rash has appeared. Evidence to this effect has been given by Von Pirquet and later by Moltschanoff.[7] The latter gives 100% of negative reactions in measles and 85% negative reactions in scarlet fever.

There has been an attempt made recently to differentiate between active and latent tuberculosis by noting the leucocyte count both before and after the Von Pirquet reaction, and Chiaravalloti[8] has shown in a series of cases of active pulmonary tuberculosis that there is a

definite increase in the total and polynuclear count after the cutaneous test. After investigating some 20 cases consisting of bone and joint tuberculosis and tuberculous peritonitis in the Children's Hospital, with this point in view, we found such a lack of uniformity in results that it was only justifiable to conclude that this test of the so-called "general reaction" to the Von Pirquet test is, at least in its present state, not applicable to cases of surgical tuberculosis

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Book Reviews.

State Board Questions and Answers. By R. MAX GOEPP, M.D. Third edition. Thoroughly revised. Philadelphia and London: W. B. Saunders Company. 1913.

The second edition of this work was reviewed in the issue of the JOURNAL for July 27, 1911 (Vol. clxv, p. 141). In this third edition considerable new material has been added, particularly with reference to serology, chemotherapy, syphilis, tropical disease, and cardiac physiology. Considerable old and superfluous material has also been eliminated, particularly in the field of materia medica; so that the total increase in size of the book is only two pages. Like its predecessors, it should be useful to teachers "as a repository of typical questions, a guide of instruction," and an evidence of the present demands of American examining boards upon candidates for registration in medicine.

Ulcer of the Stomach. By CHARLES BOLTON, M.D., D.Sc. (Lond.), F.R.C.P. (Lond.). New York: Longmans, Green and Company. London: Edward Arnold. 1913.

The author has collected much clinical and pathological data concerning gastric ulcer. He tells us, in his preface, that he purposely omits any discussion of duodenal ulcer. The book, which is nearly 400 pages long, impresses one as of more value as a book of reference than a monograph on the subject of gastric ulcer. In an attempt to make the work complete a considerable amount of irrelevant material is introduced, so that the continunity is lost and with it interest lags. Most of the material is stereotype and very little is either new or personal. The book abounds with references and no statements are made that are not backed up by citation of authorities. In this regard, at least, the book is admirable.

Diseases of the Heart. By JAMES MACKENZIE, M.D., F.R.C.P. Third edition. London: Oxford University Press. 1913.

This excellent work is so well known that the third edition requires no extended review. A comparison with the last edition published in 1910 shows what definite progress has been made in the precise diagnosis of diseases of the heart, more particularly in the field in which Mackenzie has been a pioneer, namely, cardiac irregularity. The book throughout is clear, and admirably arranged. Epecially lucid and convincing are the hundred pages devoted to the various forms of cardiac irregularity. An appendix with ninety-two case reports is of great assistance in the illustration of the points that the author desires to make. The book is well printed on good paper and concludes with an admirable index.

Mind and Health. With an Examination of Some Systems of Divine Healing. By EDWARD E. WEAVER Ph.D., sometime Fellow in Clark University, with an introduction by G. STANLEY HALL, PhD., LL.D., president of Clark University. New York: The Macmillan Company. 1913.

The author aims in this book of 500 pages, including a bibliography and index, to present in popular form, the present status of the psychotherapeutic movement. An introductory historical statement is followed by a discussion of the theories of mind and the principles of psychotherapy, as propounded by both the older and more recent writers on the subject. The bias of the author is clearly shown by the fact that a very large portion of the book is concerned with the various religious systems of healing, all of which are discussed with an open mind and with liberal quotation from original sources. The work lacks interest to physicians because of the over-emphasis placed on the religious aspects of the matter. Whatever the future may bring forth, for the present it is desirable to study facts without prejudice, and without emotional appeal, and this the author fails to accomplish. In spite of this defect and also of unnecessary verbosity, the book is written with sincerity and should certainly serve as a guide to the more popular religious aspects of psychotherapy. It does not adequately cover the more searching psychological studies of recent years, upon which the whole subject must ultimately rest.

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THE CHILDREN'S HOSPITAL.

THIS issue of the JOURNAL is published as a *Festschrift* in honor of the forty-fifth anniversary of the founding of the Children's Hospital. The completion of this period of its life coincides with the opening and occupation of its new group of hospital buildings near the Harvard Medical School. The good fortune of this transition from an old to a modern and more favorable environment should prove not only an increased opportunity for service, but a fresh stimulus to continuance of activity and progress in medical study.

The history of the Children's Hospital has been associated with names of distinction in medicine and in surgery. Its development was intimately a part of the life-work of the late Dr. Thomas Morgan Rotch, who contributed the second article in this series, and whose untimely death on the eve of its publication is doubly lamentable in that he could not see the completion of his cherished projects. The reputation of the Children's Hospital, however, has not been made in pediatrics alone. Surgically, distinction for the hospital has been won by the department of orthopedics. The history of this surgical progress is amply reviewed in the fifth article of this series.

The remaining papers, by other members of the hospital staff, present a number of special details in the work of the Children's Hospital, and give an idea of the range and variety of its activities. Like all good hospitals, it has always been devoted not solely to the relief of the sick, but to the pursuit of medical research and the furtherance of medical education. In its new and more intimate local association with the Harvard Medical School, the opportunities and possibilities of this aspect of its work should be still further increased, and in every respect the hospital should share in the impetus given to each constituent part of a great medical centre. Its well-wishers look forward from the completion of this epoch in its history to another of even brighter success and more distinguished achievement.

ADVANCE IN HOSPITAL ADMINISTRATION.

IT is fitting on this occasion of the opening of the new buildings of the Children's Hospital, to call attention to progress in administration which indicates a marked change in attitude toward the teaching of medicine, and which will place the facilities of this hospital more completely at the service of the best in medical education than has hitherto been done. It is a long road from the conditions indicated in the first report, covering the time from the opening on July 19, to the end of the year, December 28, 1869, to those brought out in the last available report, for the year 1912. The original house in Rutland Street was opened for thirty patients. The hospital on Longwood Avenue will accommodate one hundred and fifty, and is capable of almost indefinite expansion. There is in addition a convalescent home. The budget for the first six months, including property, was a little over twenty-five thousand dollars; that for 1912 was over a million and a half, exclusive of the convalescent home.

During this time the contributions to medical knowledge, as well as the relief of suffering, have been commensurate with the opportunities given, and as the hospital enters its new quarters, the managers, with the hearty support and upon the recommendation of the staff, give new evidence of their interest in medical progress.

Realizing that the closer the union between a hospital and a good teaching institution, the better the interests of the patient are served, the

board of managers, several years ago, entered into an agreement with the Corporation of Harvard College, by the terms of which vacancies in staff positions should be filled by nominations from that corporation, dependent upon confirmation by the board of managers of the hospital. This agreement contemplated only members of the visiting staff as usually understood. Recently, however, the board of managers has taken a further step, which is unique, so far as we know. At a special meeting held on February 23, 1914, acting upon the suggestion of the staff and of the executive committee, it voted to create the positions of visiting pathologist, visiting bacteriologist, visiting chemist, visiting pharmacologist, and visiting physiologist, and in accordance with the agreement, the Corporation of Harvard College was requested to make nominations to fill them. This has been done and these visiting positions are to be filled by members of the laboratory staff of the Harvard Medical School, as follows: Assistant Prof. Howard T. Karsner to be Visiting Pathologist, Prof. H. C. Ernst to be Visiting Bacteriologist, Prof. Otto Folin to be Visiting Chemist, Prof. Reid Hunt to be Visiting Pharmacologist, Prof. W. B. Cannon to be Visiting Physiologist.

The purpose of the managers of the hospital in creating these positions is that these five men shall make regular visits to the wards and shall supervise the work of the hospital in their special fields. They are to be regular members of the visiting staff and are to have full privileges in the wards with due regard to the welfare of the patients and the necessary routine work of the hospital. They will not, of course, be troubled with the need of voting on such routine matters as the appointment of house officers, but in other ways the intention is that they shall have the full privileges of staff membership.

The difference between these and existing conditions is the difference between what is indicated by the term "consultant" and the term "visiting," and that this is great any one familiar with hospital management will not hesitate to acknowledge. The action is notable as recognizing the importance of the closest possible relationship between hospital and laboratory. Such a step would not have been possible when the hospital was opened, for there were no laboratories. It is commonly not thought of now, but the slightest reflection and knowledge of medical history will show how far reaching and important it may prove to be.

THE ROBERT BENT BRIGHAM HOSPITAL.

On Sunday, March 15, the buildings of the new Robert Bent Brigham Hospital, on Parker Hill, Roxbury, were informally opened for inspection by a company of over 2000 invited guests. The completion of these buildings and the beginning of their active service mark the addition of another modern and fully equipped hospital to the large and rapidly growing group of medical institutions in Boston centering about the Harvard Medical School.

The Robert Bent Brigham Hospital will be devoted to the care of chronic diseases, surgical and medical. Its staff is composed of well-known and able older and younger physicians and surgeons of Boston. Architecturally the buildings, of brick and limestone, form a fine structure in the modified Greek style, and from their commanding location not only are well seen but enjoy an almost ideally hygienic situation. The details of their equipment are of the most elaborate and approved modern type. The hospital begins its work under the most favoring conditions, and should contribute worthily to the service of the community and to its medical distinction.

MEDICAL NOTES.

Honors for Dr. Gorgas.—On Monday of last week, March 23, Dr. William C. Gorgas, Surgeon-General of the United States Army, was entertained at dinner by the medical profession of London, in recognition of his work in the sanitation of Panama. Among those present were Sir Rickman Godlee, president of the Royal College of Surgeons; Sir Francis H. Champneys, president of the Royal College of Medicine; Sir Thomas Barlow, president of the Royal College of Physicians; Sir Francis Ferrier, president of the Medical Society; Sir Havelock Charles, president of the Society of Tropical Medicine and Hygiene; Sir William Osler, Regius professor of medicine at Oxford; Sir Clifford Allbutt, Regius professor of medicine at Cambridge; Surgeon-General Arthur W. May, medical director general, Royal Navy; Sir William Lancelot Gubbins, director general, Army Medical Service.

On March 24, Dr. Gorgas received the honorary degree of Sc.D. at Oxford.

SIZE OF FRENCH FAMILIES.—In connection with the declining French birth-rate, a comparative study has recently been made of the number of children in French families. Of 11,000,000 families, 2,000,000 were found to be without children, 3,000,000 had one child each, 2,500,000 had two, and 1,500,000 three children each. There were four children in 1,000,000 families; five in 500,000; six or over in the remainder. There were 34 families with 17 children each and 45 with 18 each.

TYPHOID IN THE MERCHANT MARINE.—Dr. Rupert Blue, Surgeon-General of the United States Public Health Service, has recently issued an open letter to managers and masters of lake and river vessels in this country, calling their attention to the high prevalence of typhoid infection among American seamen aboard such craft. During the year ended June 30, 1913, there were admitted to the United States marine hospitals 392 cases of typhoid fever among members of the merchant marine, besides many others treated in public hospitals and at home. During this period there were no cases in the United States Navy. Dr. Blue therefore urges wider adoption of antityphoid vaccination.

BUBONIC PLAGUE IN HAVANA.—Three new cases of bubonic plague were reported at Havana on March 26. One of the patients has already died.

HOSPITAL BEQUESTS.—The will of the late Mrs. James N. Gamble, which was filed for probate on March 25, at Cincinnati, Ohio, contains a bequest to Christ Hospital in that city.

BOSTON AND NEW ENGLAND.

SCARLET FEVER AT YALE.—Report from New Haven, Conn., states that on March 20 there were eight cases of scarlet fever among students at Yale College. Every step has been taken to prevent further spread of the infection.

REGISTRATION OF DENTISTS.—Of 84 candidates who took the examinations on March 4, 5, and 6 before the Massachusetts State Board of Registration in Dentistry, only 28 were passed.

MASSACHUSETTS HOMEOPATHIC HOSPITAL.—The recently published forty-fourth annual report of the Massachusetts Homeopathic Hospital records the work of that institution for the calendar year 1913. During this period 6,508 patients were treated in the main hospital, 12,411 in the out-patient department, 1,040 in the maternity department, 811 in the children's ward, and 455 in the contagious department. From the training-school 27 nurses were graduated. There is urgent need of a new ward for children, and of $100,000 for the erection of a maternity building.

MONSON STATE HOSPITAL.—The recently published report of the Monson State Hospital at Palmer, Mass., records the work of that institution for the year ended Nov. 30, 1913. The total number of patients treated during this period was 1163, of whom 604 were men and 559 women. There were 65 deaths. Considerable progress has been made on the construction of a new building for 130 male patients.

NEW ENGLAND BAPTIST HOSPITAL.—The recently published twentieth annual report of the New England Baptist Hospital records the work of that institution for the calendar year 1913. During this period 722 patients were cared for, of whom 50 were obstetric cases. A total of 383 surgical operations was performed. From the training school a class of eight nurses graduated. The hospital has a legacy to provide and equip a new and much larger building. At present the question of selecting a site is still under consideration.

HOSPITAL BEQUESTS.—The will of the late Caroline Crowell, of Haverhill, Mass., disposing of property whose value is estimated at $56,700, gives one-fourth of the residuary estate to the Hale Hospital of that city.

The will of the late Charles R. Lawrence, of Brookline, Mass., which was recently filed in the Norfolk probate court at Dedham, Mass., establishes a trust fund, of which, upon the death of the principal beneficiaries, one-fourth each is to be given to the Children's Hospital and the Massachusetts General Hospital, Boston. The Massachusetts General Hospital is also made residuary legatee.

The will of the late Sarah E. Pratt, which was recently filed in the Suffolk probate court, contains bequests of $1000 each to the Perkins Institution for the Blind and the Massachusetts Charitable Eye and Ear Infirmary.

The will of the late Joseph C. Storey, of South Boston, who died on March 15, contains

bequests of $10,000 to the Massachusetts General Hospital and $5,000 to the Perkins Institution for the Blind. The residue of the estate constitutes a trust fund which, upon the death of the testator's widow, is to revert in equal shares to these two institutions.

The will of the late Martha B. Webb, of Brookline, Mass., which was allowed in the Norfolk probate court on March 25 at Dedham, Mass., contains a residuary bequest to the Beverly (Mass.) Hospital.

Cases of Infectious Diseases reported to the Boston Board of Health for the week ending March 24, 1914: Diphtheria, 49, of which 2 were non-residents; scarlatina, 130, of which 24 were non-residents; typhoid fever, 6, of which 1 was non-resident; measles, 43, of which 1 was non-resident; smallpox, 1; tuberculosis, 44, of which 4 were non-residents.

The death-rate of the reported deaths for the week was 18.75.

NEW YORK.

American Society for the Control of Cancer.—The first of a series of meetings under the auspices of the American Society for the Control of Cancer was held at the Women's Cosmopolitan Club on March 24. The speakers were Frederick L. Hoffman, LL.D., who has collected many statistics on the subject of cancer, and Prof. James Ewing of Cornell University Medical College. The latter took issue with Mr. Hoffman on statements made by him that cancer is essentially a disease of civilization and that radium is of no value in its treatment. Dr. Ewing expressed the opinion that many local malignant growths could be cured by radium, if treated sufficiently early. The limit of the penetrating power of its rays, he said, appears to be one and one-half or two inches, and the correct dosage of this agent has not yet been definitely determined.

Work of Montefiore Home.—The twenty-ninth annual report of the Montefiore Home and Hospital for Chronic Invalids shows that during the past year 1,083 inmates were cared for, of whom 472 were still under treatment. All the patients except 43 were treated free. The new buildings in the Bronx, to which the home has lately been removed, were erected at a cost of $1,965,000, and, with its country sanatorium for tuberculosis at Bedford Hills, the institution is now able to care for 700 persons suffering from chronic and incurable disease.

Report of the Loomis Sanatorium.—The recently published seventeenth annual report of the Loomis Sanatorium for the Treatment of Tuberculosis records the work of that institution for the year ended Oct. 31, 1913. During this period 372 patients were admitted. In treatment, special attention was devoted to tuberculin, artificial pneumothorax, and the employment of graduated exercise for the production of controlled auto-inoculation. An urgent appeal is made for funds to assist in reducing the sanatorium's debt of $147,000.

Legalization of Chiropractic.—Report from Albany states that on March 25 the State Senate passed bills extending to chiropractic and naturopathy the same legal recognition now given to osteopathy.

Current Literature

Medical Record.

March 14, 1914.

1. Bushnell, G. E. *The Extension of Tuberculosis in the Immune Lung.*
2. Hays, H. *Exact Diagnosis by Accurate Instruments in the Treatment of Catarrhal Conditions of the Eustachian Tubes and Ears.*
3. Beer, E. *Adenoma of the Prostate.*
4. Marshall, V. F. *A Report of Ten Cases of Acute Perforating Gastric and Duodenal Ulcer.*
5. Harris, C. M. *Some Important Factors in the Conservation of Hearing.*
6. Tocplitz, M. *Five Hundred Examinations of the Nose and Throat in an Institution for Delinquent Boys.*

New York Medical Journal.

March 14, 1914.

1. *Erdmann, J. F. *Diverticulitis of the Colon.*
2. Rosenberger, R. C. *Experimental Study of Tubercle Bacilli Submerged in Water.*
3. Stern, H., and Sachs, L. B. *Gastric Flatulence and Disturbances of the Heart.*
4. Gilbride, J. J. *Dyspepsia Due to Chronic Appendicitis.*
5. Bush, A. D. *Tobacco Smoking and Mental Efficiency.*
6. Knox, H. A. *Psychological Pitfalls.*
7. Herzig, A. J. *Quinine and Urea Hydrochloride in Nose and Throat Surgery.*
8. Tannenbaum, S. A. *Medical Contract Practice.*

1. Erdmann presents the results of further observations on sixteen cases of diverticulitis of the colon. He believes that pain in the left side of the abdomen with tenderness and rigidity means almost always diverticulitis. Left-sided appendicitis is a rare cause of left side symptoms. Prolonged chronic diverticulitis frequently becomes cancerous. Many "cancer cures" of this portion of the gut were really cases of chronic diverticulitis only. [L. D. C.]

THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION.

MARCH 14, 1914.

1. BEVAN, A. D. *Medicine a Function of the State.*
2. LOWELL, A. L. *The Danger to the Maintenance of High Standards from Excessive Formalism.*
3. WHITEHEAD, R. H. *Administering the Preliminary College Year in Chemistry, Biology, Physics and Modern Language.*
4. HOLMES, C. R. *Hospitals and Their Relation to Medical Colleges and the Training of Internes.*
5. POWELL, R. W. *Registration Under the Canada Medical Act.*
6. CULLEN, T. S. *Adenomyoma of the Rectovaginal Septum.*
7. *MASON, J. M. *Dangers Attending Injections of the Kidney Pelvis for Pyelography.*
8. SIMPSON, F. E. *Radium in the Treatment of Blastomycosis, with Report of a Case.*
9. HABERMAN, J. V. *Mental Healing. An Admonition.*
10. BOURKE, J. *Primary Carcinoma of the Pancreas in a Patient Twenty-Two Years Old.*
11. *HOAG, A. E., AND SOLETSKY, M. *Perimyositis Crepitans. Report of a Case.*
12. BRAV, A. *Ophthalmoplegic Migraine, with Report of a Case of Recurrent Paralysis of the Right External Rectus Muscle Following Parturition.*

7. Mason in a very interesting and practical article, demonstrates the quite common occurrence of over distention of the renal pelvis by collargol used for pyelography, and subsequent damage to the kidney substance with renal infarction or even peritoneal inflammation. He quotes the work of Mallory on the histology of the condition and warns against the over-distention of the pelvis by more careful injection measured by the gravity or mercury manometer methods.

11. These authors removed a piece of muscle from a student suffering from perimyositis crepitans and found small ruptures of parts of the muscle and aponeuroses, which are later followed by hyaline thickening, which cause the creaking when two surfaces rub together. Over-exertion is the causative factor. [E. H. R.]

THE AMERICAN JOURNAL OF MEDICAL SCIENCES.

JANUARY, 1914.

1. *BARKER, L. F. *Differentiation of the Diseases Included under Chronic Arthritis.*
2. *SPILLER, W. G. *Some Causes of Disappointment in Operations on Brain Tumor.*
3. *MACCALLUM, W. G. *The Mechanism of Circulatory Failure in Diphtheria.*
4. *RUDOLF, R. D. *Bleeding in Typhoid Fever.*
5. *HALSTED. *Reconsideration of the Question of Experimental Hypertrophy of the Thyroid Gland, and the Effect of Excision of This Organ Upon Other of the Ductless Glands.*
6. *JAMES, W. B., AND HART, T. S. *Auricular Fibrillation: Clinical Observations on Pulse Deficit, Digitalis and Blood-Pressure.*
7. WARTHIN, A. S. *The Minute Changes Produced in Leukemic Tissues by Exposure to Roentgen Rays.*
8. BLOODGOOD, J. C. *Can It Be Proved from Clinical and Pathological Records That the Number of Cures of Cancer Will Be Greatly Increased by the Proper Excision in the Earliest Precancerous or Cancerous Stage of the Local Disease?*
9. ABT, I. A. *Unusual Type of Acid Intoxication in Infants.*
10. FOX, H. *Experience with Neosalvarsan at the Harlem Hospital.*
11. PEMBERTON, R. *The Metabolism, Prevention and Successful Treatment of Rheumatoid Arthritis. Second Contribution.*

1. Barker, after consideration of the different types of joint disease described both in ancient and in modern times, proposes a classification under the following main headings: 1. The true gouty arthropathies. 2. The arthropathies of severe nervous disease. 3. The (primary) hypertrophic osteoarthropathies. 4. The secondary chronic arthropathies, following various infections, and those following small foci of infection in various parts of the body. 5. The so-called (primary) chronic progressive polyarthritis.

2. Spiller, in discussing discouraging statistics in operations on brain tumor, writes particularly of the unfavorable effect upon the operative results of enlargement of the brain from tumor, distortion of the brain, especially from tumor in the posterior cranial fossa, and acute swelling of the brain,—all conditions which usually may be avoided by sufficiently early operation and proper technic.

3. MacCallum reports experiments which seem to prove that in animals injected with diphtheria toxin the heart is not materially weakened. This finding lends support to the theory that death in diphtheria may be due to vasomotor rather than cardiac failure.

4. Rudolf reviews the conflicting statements of the effect of hemorrhage in typhoid fever upon the course of the disease, some authors failing to recognize any favorable influence, while others support the evidence of Graves and of Trousseau, that improvement may follow. He publishes twelve charts of typical cases in which hemorrhage occurred (in one by venesection), in all of which the loss of blood was followed by a fall in temperature and improvement in the general condition without unfavorable effect on the pulse.

5. Halsted reports briefly upon experimental work upon excision of parts of the thyroid gland under aseptic precautions which failed to result in the hyperplasia of the remaining thyroid tissue which occurred in former experiments without asepsis. The explanation remains obscure.

6. James and Hart write to show how misleading an index of the condition of the circulation is the count of the radial pulse in auricular fibrillation. Of greater value is the simultaneous counting of the apex beat and of the radial pulse for recording which the authors have devised a method of indication on a chart. Of more interest is a method which they describe of determining the average systolic blood-pressure in these cases where the beats are of unequal force. The administration of digitalis caused a rise in blood-pressure thus estimated. [F. W. P.]

FEBRUARY, 1914.

1. *DEAVER, J. B. *Tuberculosis of the Breast.*
2. *CAMAC, C. N. B. *Dental Sepsis: Its Relation to the System.*
3. *WITHINGTON, C. F. *Pneumonic Hemiplegias.*
4. ERDMANN, J. F., AND MOORHEAD, J. J. *Splenectomy for Splenomegaly (Gaucher Type).*
5. *GREENWALD, I. *The Supposed Relation Between Paralysis Agitans and Insufficiency of the Parathyroid Glands.*
6. *COHEN, S. S. *On Some Angioneural Arthroses (Periarthroses, Pararthroses) Commonly Mistaken for Gout and Rheumatism.*
7. *BEER, E. *Leukoplakia of the Pelvis of the Kidney and Its Diagnosis.*

8. SIMON, C. E., AND WOOD, M. A. *The Inhibitory Action of Certain Analine Dyes upon Bacterial Development.*
9. *STERN, H. *Typhlo-albuminuria.*
10. PEMBERTON, R. *The Metabolism, Prevention, and Successful Treatment of Rheumatoid Arthritis: Second Contribution.*

1. Deaver has collected 69 proved cases of mammary tuberculosis from the literature and adds 5 original cases. These he analyzes and discusses in detail both from the clinical and the pathological point of view. All but one were operated by one method or another, without operative mortality. The disease is regarded as essentially a surgical one, although tuberculin treatment is recommended as of possible value when used in conjunction with operation.

2. Camac writes to emphasize the importance of recognition and treatment of oral sepsis as a not infrequent source of arthritis, endocarditis, and of other septic processes in remote parts of the body, even though the manifestations at the original focus may be slight. Radiographs, a number of which accompany the article, are the chief means by which such processes are recognized.

3. Withington describes the occasional occurrence of hemiplegias in pneumonia. These are found generally in young and rather vigorous people and often end in recovery. Since the few cases that have come to autopsy have failed to show organic lesions in the brain, the cause is unknown.

5. Greenwald reports chemical examinations of the blood serum of patients with paralysis agitans to determine the content of acid-soluble phosphorus, a constituent notably increased in parathyroidectomized dogs. His failure to find that this is increased in paralysis agitans he reports as evidence against the theory that this disease is due to parathyroid insufficiency.

6. Cohen reports cases with joint symptoms in which the features seemed to warrant the conclusion that they were angioneural in origin. He discusses the clinical characteristics of these cases and refers to the literature.

7. Beer reports a case in which following attacks of renal colic shreds of pearly white membrane of the structure of epidermis were found in the urine. These are believed to have been thrown off from a surface of leukoplakia in the pelvis of the kidney.

9. Stern maintains that albuminuria without other evidence of kidney disease may be due to a communication of the lymphatics of the cecum with the urinary tract. [F. W. P.]

BERLINER KLINISCHE WOCHENSCHRIFT.

NO. 5. FEBRUARY 2, 1914.

1. *BUMM, E. *Further Experiences in the Therapy of Carcinoma by Irradiations.*
2. WARNEKROS. *On the Technic of Roentgen Treatment of Carcinoma.*
3. LAZARUS, P. *The Present Status and New Aims of Radium-Mesothorium Therapy (First paper).*
4. *PINKUSS, A. *Further Work on the Mesothorium Treatment of Cancer.*
5. FRAENKEL, E., AND GUMPERTZ, F. *The Effect of Injections of Thorium-X on the Agglutinins.*
6. GRABS, E. *Experiences with Digifolin.*
7. *KLEINSCHMIDT, P. *Clinical Experiences with Isopral as a Rectal Anesthetic.*
8. BUCHHOLTZ, F. *A New Successful Method of Treatment of Acne.*

1. The author, in a very enthusiastic report, presents 108 cases treated with radium or mesothorium. Only 40 of these cases were operable, and though some of them had been followed for only six months, only 15 of the 108 showed recurrences at the time of the communication. Of 12 cases of carcinoma of the cervix, nine were seemingly cured (to date), 2 had recurrences and 1 was not markedly affected.

The destructive effect of the rays is found to extend about 2½ cm, below the surface—not as deep as 3½ or 4 cm., as others have claimed. The radio-active substances do not have a selective action on carcinoma, as has been stated, but the young and active tumor cells are more rapidly and completely destroyed than are the connective tissue and supportive cells.

4. This is a short critical review of the whole subject of mesothorium therapy. Pinkuss suggests that carcinoma of the stomach can be treated by making a fistula through which the substance can be brought into close contact with the growth; he does not favor the method of passing it into the stomach on a sound or bougie passed down from above. He doubts the value of intravenous injections of thorium-x, as has elsewhere been suggested and tried. The best results of all treatment with radio-active substances are dependent on more exact knowledge of the proper dosage, time of application, and filtration; and careful working-out of these factors is of supreme importance.

7. The author has used isopral in 43 cases, giving 0.1 gm. (per rectum) per kilo body weight, one hour before operation. In five cases no further anesthetic was necessary; in all the rest it was. In 4 cases the effect of the drug was very slight, and in 4 others there was no effect at all. Seven cases, after waking up, were for several hours in a highly restless and excitable condition—at times out of their heads and almost maniacal.

The toxic effect in some cases was extremely marked, showing itself chiefly in the poor pulse, altered breathing and general appearance. Kleinschmidt concludes that although in some cases its action is almost ideal, its use is not to be generally recommended. [R. H. M.]

Correspondence.

ANTIVACCINATION AND THE LEGISLATURE.

BOSTON, March 28, 1914.

Mr. Editor: To the great surprise of many intelligent people the legislative committee on public health, Drs. Clarke, Bigelow and Hart dissenting, has reported favorably a bill permitting unvaccinated children to enter the public schools of the Commonwealth upon the written request of any parent or guardian who may not believe in vaccination. At present a physician's certificate is necessary for such admission. The bill was introduced and advocated by the antivaccination agitators.

Should the bill become law, much harm in the future will be the inevitable result. The number of unvaccinated persons in the community, already too large, would be greatly increased, thereby flooding the state with material ripe for infection upon slight exposure. Its enactment would be a decided step backward in legislation towards the days when smallpox was always in our midst, not infrequently springing up in epidemics, maiming and destroying large numbers of persons needlessly and inexcusably. It would be difficult to imagine any action of the legislature that would be more ill-advised, or more cruel to the helpless portion of the community and especially to the children of the poor, the ignorant and the careless, who are unable to protect themselves properly.

As the direct result of wise legislation, Massachusetts has been practically free from the dreadful scourge of smallpox for forty years. The present generation knows little or nothing of it. Only

those who remember the last severe epidemic in Boston in 1872-3, when nearly 4000 were attacked and over 1000 died, can begin to realize the terror, the distress and the demoralization of the daily activities of the community in consequence of its presence. The outside world shunned us. Business fell off to a marked extent and the attention of the people was focused chiefly upon the state of the epidemic. Can it be possible that another object lesson of this sort is necessary to enable us to appreciate the absence of this pestilence?

This disease is preventable, but not curable. The chief factor in its prevention is vaccination. Its value has been incontestably demonstrated in all civilized countries for more than a hundred years. Time is wasted in arguments on this question in well-informed circles. Vaccination, properly done and attended to, is one of the safest surgical operations known to the medical profession. For nearly ten years Massachusetts has prepared vaccine virus for distribution to its citizens free of expense. About half a million doses have been sent out and used with no known ill results. No purer, or more reliable virus has ever been made anywhere.

No one claims that accidents never occur after vaccination, as they occasionally do after the most trivial injuries. Within eight years the writer has seen one death from the prick of a pin and one arm amputated for the scratch of a needle, yet pins and needles have not been given up, nor has any legislation been sought to prohibit their use, as yet. The risks of our every-day life far exceed those from vaccination, while the benefits derived from the latter surpass our comprehension. The accidents are preventable. They are so rare that they are a negligible factor in the question.

Sensible people everywhere are so firmly convinced of the protective power of vaccination that they will continue to avail themselves of its benefits regardless of any legislation, past, present or future. Adults can protect themselves, or take the consequences. The helpless children of ignorant or thoughtless parents, however, deserve the protection of the state. That is the chief object of the present vaccination laws. It cannot be possible that in these days of unprecedented efforts to lesson the mortality of the young, we are ready to abandon one of the most efficient measures for accomplishing that object known to modern civilization. In some of the former epidemics smallpox destroyed half of the children under five years of age, to say nothing of the blindness and other mutilations in those who recovered. It is desirable to return deliberately to conditions approaching in any degree those of former times?

A word as to the evidence of the parties in hearing. One party consists chiefly of a few well-meaning, but terribly mistaken and irresponsible persons, whose vision is not achromatic, *i.e.* who do not see clearly, who accept cheap newspaper clippings, neighborhood gossip, etc., as evidence. They never refer to official records, as there are none favoring their peculiar ideas. They endeavor to prove their case with a lot of stuff that would not be accepted in any court in the land. Their judgment is so warped that they can see only one side of the question and will not accept any evidence not agreeing with their claims. As the lawyers say, they are not competent witnesses.

The other party to this discussion comprises the medical profession all over the civilized world, whose opinion is based upon the experience of more than a century, the sanitarians, health officers and all others having to do with health problems, together with a very large proportion of the intelligent public everywhere. The alacrity with which the general public resorts to vaccination in times of danger, shows their confidence in the measure. The evidence in its favor is so overwhelming that one is lost in amazement that its value can be questioned in these enlightened days. Is it reasonable to suppose for a moment that the great mass of intelligent people the world over is wrong on this matter and that the few persistent agitators are right? If the wonderful benefit of vaccination has not been proven, then nothing in this world is susceptible of proof.

If the members of the legislature believe that the reliable, the official history of vaccination and its effects is a lie, if they believe that the medical profession is composed of hypocrites and mountebanks preying upon the public for pelf, if they believe that under the pretence of "personal liberty." the helpless children of the commonwealth should not be protected, if they believe that the antivaccinationists are better and more reliable judges of the points at issue, than are the physicians, then they will vote for House Bill 1018, which is but an entering wedge to the repeal of all laws relating to vaccination.

On the other hand, if they believe with the medical profession and the vast majority of intelligent people everywhere that vaccination is a public benefit and hence that the citizens of the commonwealth should be protected from smallpox, as they have been for forty years, they will oppose the bill in question, thereby following the wise procedure of many former legislatures.

GEORGE W. GAY, M.D.
For The Massachusetts Medical Society.

Miscellany.

CHANGES IN THE MEDICAL CORPS, U. S. NAVY, FOR THE TWO WEEKS ENDING MAR. 21, 1914.

March 19, P. A. Surgeon W. H. Short from Receiving Ship at Mare Island, Cal., to the *Cleveland*.

March 17, Surgeon A. R. Alfred, from Naval Proving Ground, Indian Head, Md., to Training Station, San Francisco, Cal.

P. A. Surgeon H. L. Dollard, to Naval Proving Ground, Indian Head, Maryland.

P. A. Surgeon I. W. Robbins, Commissioned from March 28, 1913.

Asst. Surgeon C. I. Wood, M.R.C., Commissioned from February 24, 1914.

Asst. Surgeon J. M. Quinn, M.R.C., Commissioned from February 24, 1914.

March 18, P. A. Surgeon I. S. K. Reeves, detached from *Tacoma* to *North Carolina*.

Asst. Surgeon C. P. Lynch, detached from Naval Medical School, Washington, D. C., March 28, 1914, to *Tacoma*.

March 19, Surgeon C. D. Langhorne, detached from Marine Barracks, Washington, D. C., to the *Vermont*.

March 20, P. A. Surgeon M. C Baker, from *Pittsburg* to *Chattanooga*.

APPOINTMENTS.

DR. T. MITCHELL PRUDDEN, emeritus professor of pathology in Columbia University, has been appointed by Governor Glynn a member of the New York State Public Health Council.

DR. RUDOLPH E. DIEDLING of Saugerties has been appointed by the governor of New York a commissioner of prisons.

RECENT DEATHS.

DR. DANIEL SIMMONS, who died recently at Brooklyn, N. Y., was born in 1844. He served throughout the Civil War in the ranks of the Eighty-third New York Volunteers. Subsequently he studied medicine, and in 1872 received the degree of M.D. from the New York Homeopathic Medical College. He was a member of the American Institute of Homeopathy and of the Kings County Medical Society. He is survived by his widow and by one daughter.